The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

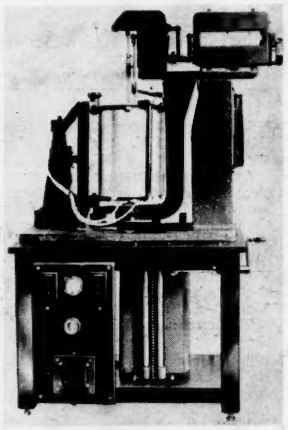
MELLON INSTITUTE

Volume XVII AUGUST, 1944 Number 8

AUG 29 944
PITTSBURGH, PA.

Direct-Reading Dilatometer Provides Dual Record

A direct-reading dilatometer which records temperature-dilation changes and temperature-time changes simultaneously in ink during heating and cooling cycles of ferrous and non-ferrous metals and many other materials has been announced by the Bristol Co., Waterbury, Conn. It is known as the Bristol - Rockwell Dilatometer, Model A-134.



The two records are made on a chart with rectangular co-ordinates for ease of interpretation and filing. The split furnace, which is designed for temperatures to 2500° F., can be pulled away from the sample for quenching or cooling without disturbing the record, and the inside dimensions allow the use of any size or shape of sample up to 1⅝ in. diameter by 5 in. long. More complete information is given in Bulletin W1803.

Mention R388 When Writing or Using Reader Service

More New Products on pp. 15, 17, 19

Thin Aluminum Sheet Arc Welded by New Process

The arc welding of aluminum and its alloys is very difficult when the sheet thickness is less than ⅛ in. In addition, it is not considered satisfactory because of spatter and excessive porosity. A new process known as multi-arc welding shows great promise of overcoming these difficulties.

Description of equipment and procedure as well as test results is contained in a paper by Malcolm R. Rivenburgh and C. Weston Steward for the fall meeting of the American Welding Society, published in *The Welding Journal* for July.

The essential elements of the process are a twin carbon torch, a heavily coated metallic electrode, a metallic electrode holder, the part to be welded, and two sources of current.

The important function of the multiple arc is that large amounts of heat are capable of being delivered in concentrated form to the surface of the materials being welded, while at the same time being under perfect control. The heat transfer and temperature are of a nature which permits the parent metal to receive a preheat and the weld deposit to acquire a postheat. This allows all gases and impurities to escape to the surface of the molten metal before it becomes plastic enough to entrap them and cause porosity.

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—save it!

Compliments

To ROBERT F. MEHL, director of metals research laboratory and head of department of metallurgical engineering, Carnegie Institute of Technology, on the award of the honorary degree of doctor honoris causa by the Escola Politecnica of the University of Sao Paulo, Brazil, where he recently completed a four months' lecture series; and also on the presentation of a gold medal for his assistance in the organization of the first Brazilian metallurgical society, known as the Associacao Brasileira de Metais.

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To CAPT. WILLIAM F. WILSBY, Pittsburgh Chapter A.S.M., formerly with the Pittsburgh Lectromelt Furnace Corp., on the award of the Legion of Merit. "for exceptionally meritorious conduct in the performance of outstanding service as officer in charge of the Hawaiian Department and Central Pacific Area Searchlight Repair Shop."

E. R. Mertz Organizes Heat Treating Company

E. R. MERTZ, a member of the Executive Committee of the Los Angeles Chapter A.S.M., has resigned as chief metallurgist for the Bendix Aviation Corp., North Hollywood, Calif., to organize the Mertz Heat Treating Co., Van Nuys, Calif., of which he is owner and general manager.

McCarthy Promoted by Wickwire Spencer

B. L. MCCARTHY, a past secretary of the Buffalo Chapter A.S.M., has been promoted by Wickwire Spencer Steel Co. to assistant general superintendent of the Buffalo plant. Mr. McCarthy was previously chief metallurgist of Wickwire Spencer and is well known for his outstanding contributions to the study of steel metallurgy.

USE HOTEL RESERVATION FORM on page 18 for the National Metal Congress and War Conference Display, Cleveland, Oct. 16-20, and mail immediately to the chairman of the Housing Bureau.

What's NEW..... in THE METALS REVIEW

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Many War Production Problems Solved By Boston WPAC

The outstanding success and usefulness of the Boston Chapter A.S.M. War Products Advisory Committee was exemplified in a detailed report submitted recently by the director of the Committee, George H. Burnett of Hartel Brothers & Co., to Boston Chapter Chairman John T. Norton.

The Boston Chapter WPAC consists of some 80 members—at least three qualified men selected to act as advisors or consultants on each of 20-odd subjects from annealing to X-rays.

One of the first problems solved by the Committee was submitted by a Boston concern that had taken a contract to machine drop forgings of S.A.E. 4140 steel. They were having difficulty in producing a satisfactory milled finish and didn't know whether it was the wrong speed, feed, cutters, lubrication, or type of milling.

Parts Tested by Committee Member

The company was invited to submit samples of rough forgings, some that had been machined and were acceptable, and some that had been rejected. A committee member connected with a plant in which the same type of steel was drop forged and machined, took the samples home, photographed the structures of the good and bad forgings, normalized some of the rejected ones, took some more photographs, made a report in writing to the sub-contractor, including photographs, and proved that the lack of uniformity was caused by lack of normalizing after forging.

Anther problem solved was submitted by the Boston *American*, a local newspaper restricted in its use of zinc plates for lithographing and in search of a suitable steel for this purpose. Two sources of supply were found.

For the Boston Ordnance District the Committee was able to furnish a list of all annealing furnaces east of the Connecticut River capable of annealing 12-ft. bars of bullet steel. The steel mills could produce the bars but annealing was the bottleneck.

Vermont Manufacturer Helped

A Vermont manufacturer who was having difficulty in meeting the Rockwell hardness part of a specification on wedges was referred to the Committee by a Navy lieutenant. With the help of Porter Forge & Furnace, Inc., who conducted some heat treating experiments, and the cooperation of some Navy Yard members, the War Products Advisory Committee was able to solve the difficulty.

A Framingham concern broke the frame of a large press and wanted it thermit welded. They had the information next morning.

These are only a few examples of the many occasions when the ASM-WPAC proved its services invaluable in promoting war production in the Boston area. So successful was the Committee that the War Production Board suggested to the American Society of Mechanical Engineers, and the Boston Ordnance District suggested to the Chemical Society, that these organizations set up similar committees to function in their respective fields.

American Chain Acquires Wilson Mechanical

Wilson Mechanical Instrument Co., Inc., 383 Concord Ave., New York 54, manufacturer of the Rockwell hardness tester, was recently acquired by American Chain & Cable Co., Inc., Bridgeport, Conn., Charles H. Wilson will continue to be actively associated with the company.

Tile Craft to Represent Chas. Taylor Sons Co.

Tile Craft, Inc., 340 N. Dearborn St., Chicago 10, Ill., has been granted exclusive representation of The Chas. Taylor Sons Co. refractories in this area. They offer a complete refractories service on Taylor firebrick, fireclay, Sillimanite, and Taylor zircon.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-83. **Nodulizing of Iron Ore.** Gilbert E. Seil. *Skillings Mining Review*, v. 33, June 17, '44, pp. 1-2, 4, 6, 15.

History, comparable processing, comparison of a sintering plant with a rotary kiln nodulizing plant, comparison of materials charged, comparison of products of the sintering machine and the nodules from the rotary kiln, comparison of cost of operation, estimated cost sheet, a theory covering conditions affecting the operation of rotary kilns, a theory covering the heat liberation and absorption in the rotary kiln, some suggestions for the operation of rotary kilns.

1-84. **Kaiser's Stake in the Magnesium Industry.** S. D. Kirkpatrick. *Chemical & Metallurgical Engineering*, v. 51, June '44, pp. 104-106.

The "bugs" worked out of the carbothermic process. Meanwhile vast new raw material sources have been uncovered and several valuable products and byproducts developed for war uses.

1-85. **The Extraction of Indium from Lead-Tin Bullion.** John Coyle. Electrochemical Society Preprint 85-19, 7 pp.

A procedure is described by which indium may readily be extracted from molten complex lead-tin alloys by treatment at moderate temperatures under a fused mixture of lead and zinc chlorides. A qualitative survey is presented of other methods, including electrolysis, by which similar results may be accomplished.

1-86. **A Survey of Slag Control Methods.** W. O. Philbrook and A. H. Jolly. *Blast Furnace & Steel Plant*, v. 32, July '44, pp. 793-797.

Summary of a study of slag control methods. Following techniques investigated: (1) Visual inspection of pancake samples; (2) visual examination of powdered slags; (3) microscopic examination of polished slag samples; (4) measurement of the basicity of suspensions of powdered slag in distilled water; and (5) attempts to determine "free Ca" by chemical methods similar to those used for cement clinker.

1-87. **Raw Material Mining and Beneficiation at Kaiser Company, Inc., Iron & Steel Division, Fontana.** T. M. Hart. *Blast Furnace & Steel Plant*, v. 32, July '44, pp. 798-802.

Mining and treatment of coal and iron ore; ore bedding; blast furnace.

1-88. **Some Aspects of Commercial Production of Alloy Steels to Hardenability Requirements.** W. G. Bischoff. *Blast Furnace & Steel Plant*, v. 32, July '44, pp. 803-806.

Cast tests vs. forged test results; comparison between positions in heat; correlation between various laboratories; hardenability as calculated from chemistry compared to actual results obtained.

1-89. **Steel Melting.** A. H. Leckie. *Iron & Steel*, v. 17, May 18, '44, pp. 383-390.

Fuel losses can be avoided by simple means which do not involve major alterations—more frequent use of the damper, better control of gas flow, good maintenance of doors, sills and parts, the use of insulation and the avoidance of short-circuiting during reversals. 7 ref.

1-90. **Rimming Steel.** T. Swinden, W. W. Stevenson, and G. E. Speight. *Iron & Steel*, v. 17, May 18, '44, pp. 419-421.

Examination of the carbon and oxygen relationship in the solidification of basic open-hearth steel.

1-91. **Making Electric Furnace Aircraft Steels.** *Industrial Heating*, v. 11, July '44, pp. 1102-1108.

Advantages of electric furnaces; furnace design; charging and melting down; procedure for typical heat; alloy recovery.

1-92. **Slag Control.** A. Jackson. *Iron & Steel*, v. 17, June '44, pp. 498-500.

Notes on basic open-hearth tilting furnaces using phosphoric iron.

2. PROPERTIES OF METALS

2-30. **Metals in the Stars.** Harold Spencer Jones. Institute of Metals *Journal*, v. 70, May '44, pp. 175-196.

Spectrographic methods which permit the identification of the metals present in the stars. The elements present in the sun are then discussed, it being emphasized that only the elements in the outer layers of the sun and stars can be determined. The spectrum of the sun's corona, which until recently provided one of the unsolved problems of astronomy, is shown to be due to atoms of Fe, Ni and Ca in states of high ionization.

2-31. **Aluminum in the Chemical Industries.** *Light Metals*, v. 7, June '44, pp. 267, 268, 269-273.

Deals almost exclusively with unalloyed aluminum and the resistance of the metal to corrosion by various inorganic media.

3. PROPERTIES OF ALLOYS

3-115. **Austenitic Valve Steels.** *Automobile Engineer*, v. 34, May '44, p. 193.

Effect of nitrogen on the properties of these alloys.

3-116. **The Metallurgy of Modern Alloys.** R. H. Harrington. *Steel Processing*, v. 30, June '44, pp. 364-365, 392.

A possible concept of strain as the pressure variable relative to alloy phase diagrams; the pressure-temperature composition diagram for cold-rolled tin bronzes.

3-117. **Notes on Magnesium Alloy in Design.** R. O. Brittan. *Automotive Industries*, v. 90, June 15, '44, 26-29.

Mechanical properties of magnesium for general design work.

3-118. **Metallurgy of the Gray Iron Matrix.** R. J. Hafsten. *Iron Age*, v. 153, June 22, '44, pp. 48-51.

If gray iron is looked upon as being a graphitic steel, its metallurgy becomes less of a mystery. Observations from S-curves, influence of alloys. 13 ref.

Materials Index

To the Metal Literature Survey

THE FOLLOWING tabulation classifies the articles annotated in the Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-83-86-87-89-90-92; 2-30; 3-124-126; 4-27-28-30; 6-36; 10-36; 12-160-170-171-173-175-176; 16-90-91-94-95; 17-35; 18-141-153-155-157-162; 19-194-207-243; 20-232-242-271; 21-80-87; 22-285-287-293-294-306-332-337; 23-196-213; 25-156; 26-72.

Cast Iron

3-118; 12-152; 14-240-245-262-264-267-269; 16-96; 17-34; 19-207; 22-292-338-339.

Cast Steel

3-119; 12-153; 18-137-143-144; 22-338.

Wrought Carbon Steel

3-121-131-133; 4-24-26-29; 7-69-70-72; 12-180; 18-140-158; 19-182-206-213-214; 22-330-345-347; 23-199; 25-160.

Alloy Steel

1-88-91; 3-115-123-125-130-132-134; 12-166-177-179-180; 18-139-150-158-159-160; 19-185; 22-279-314; 23-201-209-211; 25-160.

Stainless and Heat Resisting Steel

4-25; 19-190-211; 23-221.

Toolsteels and Carbides

5-30; 12-165; 18-135; 20-233-266; 22-313-321; 23-207-219.

General Non-Ferrous

2-30; 3-116; 10-38; 14-239; 19-179-194; 22-337; 26-72-74.

Aluminum

2-31; 3-129; 6-36; 7-71; 12-159-174; 14-243-249-265; 18-134; 19-183-184-193; 20-249-263; 22-288-298-300-302-348; 23-216-217; 26-75.

Magnesium

1-84; 3-117; 12-161-164-174; 14-244-265; 19-184-204; 20-238-257; 21-84; 22-302; 23-216 25-155.

Copper, Brass and Bronze

3-116-122-126-129; 5-32; 8-55; 14-246-251; 16-97; 17-31; 20-249; 26-68.

Nickel, Monel and Nickel Alloys

5-28; 12-173.

Lead and Lead Alloys

7-75; 26-68.

Tin and Tin Alloys

7-71; 8-52-59; 22-330; 26-70-71.

Zinc and Zinc Alloys

7-72-73-74; 8-56; 14-256; 19-198; 20-249; 26-68.

Miscellaneous and Minor Metals

1-85; 5-28; 10-37; 22-344; 24-223; 26-69.

3-119. **Hardenability of Cast Steel—Symposium.** *Metals & Alloys*, v. 19, June '44, pp. 1415-1424.

Introduction, by C. W. Briggs; Hardenability of cast steel and wrought, by J. B. Caine; Use of the end-quench test for cast steel, by E. J. Wellauer; Hardenability of some cast steels, by Frank Kiper; 1 ref.

3-120. **Data on Springback of Metals.** Robert E. Oestreich. *Aero Digest*, v. 45, June 15, '44, pp. 77-81, 138.

Data accurate for die makers, tensile elements analyzed.

3-121. **Creep Properties of Steels Utilized in High-Pressure and High-Temperature Superheater and Steam Pipe Practice. Part I: Carbon Steels.** H. J. Tapsell. Institution of Mechanical Engineers *Proceedings*, No. 1, '44, pp. 54-62.

Creep properties of carbon steels used in superheater headers, superheater tubes, and steam pipes for service at temperatures up to about 480°C. Object was to obtain data for the estimation of the stress-temperature relationships for specific creep strains of 0.1 to 0.5% to occur in 100,000 hr., and these have been obtained with sufficient precision to warrant their acceptance for practical purposes. Similar components in Mo steel are under investigation.

3-122. **Available Beryllium in Copper.** H. G. Williams. *Metal Progress*, v. 46, July '44, pp. 79-81.

Beryllium-copper having the required analysis may fail to develop expected properties. Beryllium present but not "available" for hardening is often responsible for this trouble, as well as for certain difficulties encountered in fabrication.

3-123. **Strong, Fine Wire; Non-Magnetic.** Herbert H. Uhlig and John J. Naughton. *Metal Progress*, v. 46, July '44, pp. 82-83.

Non-magnetic wires of difficult-to-draw Hadfield manganese steel can be produced by carburizing the easier drawn, low carbon manganese-iron alloy. Gas-phase carburization, followed by homogenization at 1000° C., required only 4 min. for 20-mil wire. The resulting wire contained about 1% carbon and was completely austenitic.

3-124. **Effects of Wartime Developments on Future Steels.** W. P. Eddy. *Machine Design*, v. 16, July '44, pp. 127-132, 162, 164.

Summary on following wartime developments: Fatigue endurance, heat treatment, castings, welding, alloy evaluation, hardenability, special addition agents, and NE steels. Predictions (guesses) made as to how future practices with respect to steels will be affected. 20 ref.

3-125. **Boron in NE 9440 and SAE 4640 Steel.** G. F. Comstock. *Iron Age*, v. 154, July 13, '44, pp. 48-53.

Economy possible in the substitution of boron for Ni, Mo or Cr in the heat treated forging steels, NE 9440 and SAE 4640. The substitution gives equal or better hardenability; and tensile, impact or machinability properties show no difference. Tempering temperature may require some adjustment, especially when Mo is omitted.

3-126. **Copper-Covered Steel Wire at Radio Frequencies.** B. R. Teare and E. R. Schatz. Institute of Radio Engineers *Proceedings*, v. 32, July '44, pp. 397-403.

At radio frequencies the current in copper-covered steel is confined to the Cu portion alone. The resistance and internal inductance are as low as for solid Cu wire of the same outer diameter. ¾ of the Cu that would be required for a solid Cu conductor can be saved by using Cu-covered steel. 7 ref.

3-127. **Effect of Notching on Strained Metals.** G. Sachs and J. Lubahn. *Welding Journal*, v. 23, June '44, pp. 272-s-279-s.

The experimental evidence of notches as they affect the behavior of metals in static tension. 29 ref.

3-128. **Strains in Riveted Joints.** J. A. Chamberlain. *Aero Digest*, v. 46, July 1, '44, pp. 101-102.

Little data on oversize rivet holes and stressed rivets available, and the effect these two conditions have upon the strength of joints. Tests are to evaluate these two adverse conditions.

3-129. **Isothermal Treatments of Some Precipitation Hardening Alloys.** *Industrial Heating*, v. 11, July '44, pp. 1088-1090.

Effects of some "isothermal treatments" upon the mechanical properties. Three industrial alloys were studied: (1) 97% Cu, 2.6% Co, 0.4% Be; (2) 96% Al, 4% Cu, and (3) 92.7% Al, 7% Si, 0.3% Mg.

3-130. **Hydrogen Content and "Flaking" of Acid Open Hearth Steel: II.** B. B. Rosenbaum. *Industrial Heating*, v. 11, July '44, pp. 1110-1114.

"Flaking" in alloy steels with reference to conjectural reasons for its occurrence, and discussions of whether hydrogen alone is the source for this trouble.

3-131. **A Study of a Shell-Steel Ingot.** D. Binnie. Iron & Steel Institute, Advance Copy, Feb. '44. 19 pp.

An ingot of shell steel, teemed uphill, and containing 0.47% of C and 0.88% of Mn. Information given on the manufacture of the steel. The sulphur print and analyses shown. White spots of precipitated ferrite are seen in all sections of the ingot except the feeder head. Lower half of the ingot had, on sulphur printing, a zoned effect: A light colored zone at the surface, a dark zone, a light colored zone and again the normal dark zone of the ingot. This zoning is compared with the acid-etched surface of the metal. Detailed analysis of the steel given.

3-132. **Hardenability.** W. Steven. *Iron & Steel*, v. 17, May 18, '44, pp. 430-432.

Effect of small additions of Cr and Mo to a grain-size-controlled 0.9% Ni steel.

3-133. **Shell Steel.** D. Binnie. *Iron & Steel*, v. 17, May 18, '44, pp. 451-458.

Study of the heterogeneity of a three-ton ingot.

3-134. **Bursting Tests on Notched Alloy Steel Tubing.** G. Sachs and J. D. Lubahn. *Welding Journal*, v. 23, July '44, pp. 351-356s.

Test procedure; bursting tests on notched and unnotched tubing; tubing provided with a double notch; tubular specimens machined from rod.

4. STRUCTURE

4-23. **Influence of Preliminary Deformation on the Decomposition of Austenites on Cooling.** *La Technique Moderne, Engineers' Digest*, v. 1, June '44, p. 384.

The decomposition of austenites at a constant temperature in the upper transformation range takes place as a process of germination and growth. The graphs of quantity-change against time show an initial period of inhibition, followed by a period of acceleration and a final slower period.

4-24. **Unusual Microstructures.** T. H. Schofield. *Iron & Steel*, v. 17, May 18, '44, pp. 407-408.

Ferrite envelopes in mild and medium C steels.

4-25. **Acid-Resisting Iron.** J. E. Hurst. *Iron & Steel*, v. 17, May 18, '44, pp. 425-426.

An unusual type of structure has been noted in commercial iron-silicon alloys containing upwards of 10% of Si, when etched under certain conditions. This structure, which has been observed by other investigators, is not "real" but its formation under the conditions described is characteristic of the high silicon iron alloys.

4-26. **The Carbide Phase.** J. E. Hurst and R. V. Riley. *Iron & Steel*, v. 17, May 18, '44, pp. 427-429.

Occurence in high silicon Fe-C alloys.

4-27. **Martensite.** H. Lipson and Audrey M. B. Parker. *Iron & Steel*, v. 17, May 18, '44, pp. 436-438.

New experimental evidence concerning the lattice structure.

4-28. **Cementite.** N. J. Petch. *Iron & Steel*, v. 17, May 18, '44, pp. 438-440.

Interpretation of the crystal structure.

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4-29. Heterogeneity. T. Swinden. *Iron & Steel*, v. 17, May 18, '44, pp. 476-477.

Examination of a rimming-steel ingot containing 0.29% C.

4-30. The Interpretation of the Crystal Structure of Cementite. N. J. Petch. The Iron and Steel Institute. Advance Copy, Feb. '44, 8 pp.

Previous work on the structure of cementite extended; cementite a framework of close-packed iron atoms held together by metallic bonding, with the small carbon atoms in the largest interstices, these atoms also being held in position by bonding which has a certain degree of metallic nature; possibility of variation in the cementite composition is considered, and experimental work described.

4-31. Microstructure. W. J. Wrazej. *Iron & Steel*, v. 17, June '44, pp. 506-508.

"Barley-shell" markings produced by hydrofluoric acid etching agents.

5. POWDER METALLURGY

5-27. Review of Patents on Electrolytic Methods for Making Powdered Metals. Joseph Rossman. Electrochemical Society Preprint 85-21, 4 pp.

An outline review is given of United States patents relating to electrolytic methods for making powdered metals.

5-28. The Early Days of Nickel-Tungsten Powder Metallurgy. M. Pirani. Electrochemical Society Preprint 85-22, 6 pp.

A method is described for the production of fine nickel-tungsten wires by cold rolling and drawing a well-sintered, pressed mixture of 90 to 94% fine tungsten powder and 10 to 6% nickel powder. The process was carried out in 1907 to 1909.

5-29. Presses and Processes for Metal Powder Products. E. V. Crane and A. G. Bureau. *Iron Age*, v. 153, June 29, '44, pp. 36-41.

Making of porous products such as bushings and then solid compression problems, showing different types of presses which have been used and others which offer advantageous features worthy of consideration.

5-30. Carbide Parts Formed by Hot Pressing. *Modern Industrial Press*, v. 6, June '44, p. 32.

Cemented carbide parts too large to be sintered in available furnaces, and special, thin-walled parts that tend to go out of round when pressed and sintered in the regular way, made possible at Carboloy Company, Inc., Detroit, by development of a "hot press" method which incorporates in a single operation the three distinct processes of pressing, semi-sintering and sintering.

5-32. Copper in Powder Metallurgy. J. J. Cordiano.

5-31. Presses and Processes for Metal Powder Products. E. V. Crane and A. G. Bureau. *Iron Age*, v. 154, July 6, '44, pp. 62-67.

Principles for selection of dies, heat treatment and presses that have overcome many of the shortcomings of powder metallurgy techniques. 8 ref.

Canadian Metals & Metallurgical Industries, v. 7, July '44, pp. 33-35, 44.

Production to close specifications and applications in manufacture of parts. 9 ref.

5-33. Processes for Making Metal-Powder Products. E. V. Crane and A. G. Bureau. *Steel*, v. 115, July 24, '44, pp. 90-94.

Description of standard methods and equipment for making a wide diversity of powder-metal machine parts and products.

6. CORROSION

6-34. Corrosion Fatigue. A. U. Huddle, and U. R. Evans. *Iron & Steel*, v. 17, May 18, '44, pp. 405-407.

Measurements made with a new feeding arrangement.

6-35. Corrosion Research. U. R. Evans. *Iron & Steel*, v. 17, May 18, '44, pp. 441-447.

Interim report of progress at Cambridge University. Wet corrosion; methods of protection; corrosion fatigue, oxidation, tarnishing and film-growth.

6-36. Corrosion Protection of Metals. K. G. Comption. *Canadian Metals & Metallurgical Industries*, v. 7, July '44, pp. 27-28, 53.

Mechanism of corrosion process; natural and applied protective coatings; types of coatings; steel protection; aluminum alloys; marine corrosion.

6-37. The Formulation of Anti-Corrosive Compositions for Ships' Bottoms and Underwater Service on Steel. F. Fancutt and J. C. Hudson. Iron & Steel Institute, Advance Copy, June '44, 65 pp.

The effect of the pigment and medium; formulation and details of paints; physical properties and results of storage tests; details of painting the specimens; preparation and compositions of paints.

7. PROTECTION

7-67. The Theory and Use of Zinc Chromate Primers. Paul O. Blackmore. *Industrial Finishing*, v. 20, June '44, pp. 38, 40, 42, 44, 46, 48, 52, 54, 59.

What primers are made of, why used, and how to select; control and use to get the best results; what makes a primer adhere firmly and permanently to metal, and how it protects metal surfaces from destructive corrosion.

7-68. Bonderizing. *Automobile Engineer*, v. 34, May '44, pp. 191-193.

Manner in which a non-metallic phosphate coating is formed and immersion Bonderizing and Spra-Bonderizing. Comparative tests with a view to evaluating the process.

7-69. New Process for Corrosion-Proofing Steel Sheets. O. E. Brown. *Steel*, v. 115, July 10, '44, pp. 90, 92.

Thermo-chemical treatment for mild steel sheet or strip stock held capable of giving protection against corrosion for protracted periods in storage or during processing. Material coated may be drawn, spun or shaped without harming surface.

7-70. Precoated Metal Strip. R. L. Hartford. *Steel*, v. 115, July 17, '44, pp. 132, 188.

Steel and other materials in coil form are finished prior to fabrication by new method, eliminating need for final finishing and minimizing handling requirements.

7-71. Tinning of Light Metals by Means of Ultrasound. *Light Metals*, v. 7, June '44, pp. 263, 264.

Theory and practice of the application of supersonics to facilitate tinning of aluminum.

7-72. Electrogalvanizing of Strip Steel. Ernest H. Lyons. *Canadian Metals & Metallurgical Industries*, v. 7, July '44, pp. 36-38, 47.

Preparation, processing, properties and tests. 34 ref.

7-73. Flow Coating Padlocks in Electrostatic Zone. Byron Morrill. *Industrial Finishing*, v. 20, July '44, pp. 22, 23, 24, 26, 42.

Coating problem for ordinary shaped padlock made of a zinc die casting, which has a superior type mechanism requiring close tolerance.

7-74. Zinc Surfaces Will Hold Paint. H. E. Van Siclen. *Industrial Finishing*, v. 20, July '44, pp. 52, 56, 58, 63, 64, 66.

Detailed results of different treatments worked out to make paint adhere to various zinc coated surfaces; also to other metals. Tests included bending and real outside exposure for different periods of time.

7-75. The New Hot Dip Lead Alloy Coating Technique. *Modern Industrial Press*, v. 6, July 44, p. 20.

New alloy and flux developments, as well as improved technique of application, now point the way to wide use of low tin content alloy coatings to render metal products corrosion resistant.

8. ELECTROPLATING

8-52. Metallic Substitutes for Hot-Dipped Tin Plate. Roger H. Lueck and Kenneth W. Brighton. *Industrial & Engineering Chemistry (Ind. Ed.)*, v. 35, June '44, pp. 532-540.

Since about half of the tin imported is used for tin plate, most of which is fabricated into cans, the tin conservation program of the canning industry is of major importance. This program hinges on the utilization of bonderized black plate and 0.5 lb. electrolytic tin plate as substitutes for hot-dipped tin plate. The performance of these conservation plates in food cans is briefly described. 11 ref.

8-53. The Fundamentals of Chemistry for Electroplaters. Samuel Glasstone. American Electroplaters' Society *Monthly Review*, v. 31, July '44, pp. 635-638.

Oxidation and reduction.

8-54. Inspection Tests for the Adhesion of Electroplated Coatings with Particular Reference to the B.N.F. Adhesion Test. A. W. Hothersall and C. J. Leadbeater. Electrodepositor's Technical Society Reprint, '44, 13 pp.

B.N.F. adhesion test developed for use in the inspection of electroplated coatings. The test was designed to enable non-adherent or, at the best, very slightly adherent coatings of ordinary commercial thickness (up to 0.002 in.) to be detected. It appears to have possible applications to coatings, both metallic and non-metallic, formed by other methods.

8-55. Studies on Brass Plating. S. G. Clarke, W. N. Bradshaw and E. E. Longhurst. Electrodepositors' Technical Society Reprint, '44, 26 pp.

Tests on brass plating baths, carried out with special reference to the effects of the various factors on the composition of the deposit and its efficiency of deposition. 26 ref.

8-56. Zinc Plating of Large Aircraft Structures. Manuel Sanz. *Modern Industrial Press*, v. 6, June '44, pp. 52, 54, 56, 58.

A three-in-one operation which makes possible the cleaning, zinc plating and demagnetizing of a metal surface in a single tank. The technique not only has proved itself more economical but has been found more effective than the former painting method.

8-57. Further Experiments in Rainbow Plating. Oliver P. Watts. *Products Finishing*, v. 8, July '44, pp. 36-38.

Formula for molybdate rainbow-plating. Addition of ammonium carbonate as a conducting salt widens the bands of color. For variety in colors, it is necessary that the deposit vary in thickness.

8-58. The Chemistry of Electroplating. C. B. F. Young. *Products Finishing*, v. 8, July '44, pp. 42-44, 46, 50, 52, 54, 56.

Halide family is treated, and in the latter part the periodic law of the elements is developed and illustrated.

8-59. Operates Three Continuous Tin Plate Lines. *Steel*, v. 115, July 17, '44, pp. 126-128.

Sparrows Point plant has a daily output of 4000 base boxes of half-pound plate. Alkaline plating bath is employed and six lines for brightening or reflowing operation. Sequential steps in process presented.

8-60. Watch Plated Plastics, They're on the Move. *Modern Industry*, v. 8, July 15, '44, pp. 38-40.

Advantages and disadvantages of plastics.

10. ANALYSIS

10-35. Photoelectric Colorimetry. E. C. Pigott. *Iron & Steel*, v. 17, May '44, pp. 363-364, 366.

Use of photocells in quantitative metallurgical analysis. 74 ref.

10-36. Pig Iron. *Iron & Steel*, v. 17, May 18, '44, pp. 413-414.

Standard analytical methods for sulphur and phosphorus.

10-37. The Rapid Photometric Determination of Beryllium in Beryllium-Containing Minerals and Rocks. G. H. Osborn and W. Stross. *Metallurgia*, v. 30, May '44, pp. 3-6.

Accurate and reproducible analyses are rapidly obtained. The method described.

10-38. Organic Reagents in Quantitative Metallurgical Micro-Analysis—Part II. R. Belcher and C. E. Spooner. *Metallurgia*, v. 30, May '44, pp. 49-52.

Theoretical principles underlying the application of organic reagents to inorganic analysis. Practical applications to the micro-analysis of metals. Methods for the micro-determination of silver, lead, copper, antimony, tin, aluminum, iron, nickel, zinc and magnesium are reviewed together with brief reference to other metals and special techniques.

11. LABORATORY APPARATUS, INSTRUMENTS

11-81. Precision Measurement. *Automobile Engineer*, v. 34, May '44, pp. 208-210.

Optical instrument with the primary function of checking the angular relationship of plane surfaces. The three models available are briefly described, and details are given of a few of the applications.

11-82. Control and Instrumentation. John F. Black. *Canadian Metals and Metallurgical Industries*, v. 7, June '44, pp. 38-41, 56-57.

Pyrometrical laboratory; organization; gas producers; soaking pits; waste heat boiler and stoker fired boilers; gas-fired forge and press furnaces; car and rotary furnaces; gas-fired hood type, wire anneal furnaces; electric gun barrel, pit type furnaces; electric car furnace; electric tube-anneal, pit type furnaces; electric rod-hardening furnaces; electric salt bath annealing furnaces; electric tool pit furnaces; oil fired car furnaces; oil fired forge furnaces; oil fired rolling mill furnaces; oil fired continuous wire anneal furnace; oil fired continuous billet furnace.

11-83. Electronics. J. H. Hopper. *Steel*, v. 115, July 10, '44, pp. 106-108, 127.

Photoelectric relays, while differing in operating characteristics and physical construction, are finding increased application in rolling mills particularly where a difficult limit-switch application is encountered. Pinholes in tinned strip as well as flow lines on electrolytic tin plate are detected by electronic equipment. Many mill problems are solved by use of electronic devices.

11-84. Electronics in Review. W. D. Cockrell. *Iron Age*, v. 154, July 20, '44, pp. 58-62.

Interprets the electronic tube as a tool comparable with tools of the trade, such as a milling cutter or a tungsten carbide bit. Describes electronic tube applications in terms that are part of the metal working field. Presents an imposing recapitulation of the new skills and savings that these applications have made possible.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-152. A Metallographic Quality Test for Malleable Iron. H. W. Lownie and C. T. Eakin. *Steel*, v. 114, June 26, '44, pp. 96, 98, 100.

Photomicrographic standards used to evaluate malleable iron in terms of amounts of primary graphite, primary cementite and pearlite present. Some possibilities of non-destructive micro sampling by means of a core drill described.

12-153. Relationship of Brinell Hardness and Yield Stress, in Certain Cast Steels. T. W. Ruffle. Institute of British Foundrymen Advance Copy 801, June 10, '44, 5 pp.

Yield point and ultimate stress of carbon manganese steel, heat-treated and tested as described can be estimated by the formulae:

$Y.P. = B.H.N. \times 0.08 + 12.56$

$U.S. = B.H.N. \times 0.15 + 13.32$

with an accuracy of $\pm$ 1 ton per sq. in. for the former and $\pm$ 1.5 tons per sq. in. for the latter.

12-154. High-Fidelity Photomicrography. J. Winning. *Iron & Steel*, v. 17, May '44, pp. 348-350.

High-power microscopy necessitates minute attention to every detail of the optical systems, both of the microscope itself and the illuminating apparatus. Some of the factors often overlooked are dealt with.

12-155. Damping Capacity. Leopold Frommer and A. Murray. *Iron & Steel*, v. 17, May '44, pp. 367-370.

Non-destructive testing method at low stresses for light.

12-156. Stress Analysis. *Automobile Engineer*, v. 34, May '44, pp. 179-181.

Experimental methods employed in America. Brittle lacquer coatings, grades of stress-coat, full crack patterns, quantitative analysis, extensometers, electric strain gages, measurement of dynamic stresses, applications of stress analysis.

12-157. Determination of Wear by Surface Measurement. Geo. Schlesinger. *Machinery* (London), v. 64, June 8, '44, pp. 626-630.

Object is to compare the surface roughness of the used with the unused liner, each being heat treated and machined in the same way; compare the roughness due to wear and different machining operations; to check the differently worn surface; to determine the significance of certain bright circumferential grooves in the surfaces; to determine the best surface of the used liners after 126 hr. under load.

12-158. Improved Method of Printing from Radiograph Negatives. S. H. Thorpe and D. W. Davison. *Engineers' Digest*, v. 1, June '44, pp. 398-400.

A compensating filter to mask the printing light, enables quite high contrast to be retained for showing up defect images while avoiding the need for reproducing a wide range of densities throughout the picture as a whole.

(Continued on Page 5)

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

Published by the
American Society for Metals
7301 Euclid Ave., Cleveland (3), O.

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Subscriptions one dollar a year. Entered as Second Class Matter, July 26, 1930, at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Ray T. Bayless.....*Editor*
M. R. Hyslop.....*Managing Editor*

Cleveland, Ohio—August, 1944
Volume XVII Number 8

Jet Pickling Improves Process By Mechanical Scrubbing

By the introduction of pressure spray and jet pickling, the word "pickling" takes on a new meaning, says an article on "Jet Pickling" by W. E. Grant in the April 21st issue of the British weekly, *Metal Industry*. This is because the removal of oxides and scale is accomplished more by mechanical means than by chemical action between the pickling solution and the material being pickled. Any chemical reaction taking place is greatly accelerated by the force of the sprays, so that soluble oxides are removed in a far shorter time.

In the pickling of steel, where the scale is composed of three separate iron oxides, the soluble ferrous oxide layer is rapidly dissolved, and as this occurs underneath the insoluble oxides the latter are mechanically brushed off the surface by the action of the jets.

Advantages Justify Cost

The cost of equipment incorporating the jet principle may not be less than the immersion type because, although only half the length, there are the additional costs of pumps, filters, piping and tubes. Nevertheless, the advantages accruing from the jet principle more than justify even an additional capital outlay.

In addition to starting with half the amount of acid in the jet pickling process, the acid during recirculation is being continuously filtered. The pumps therefore are always delivering a clear solution. Pickling time is at least halved by the new process. Hence, for the same production, pickling by immersion takes up a great deal more space, or alternatively, a jet plant equal in size to any immersion plant will cope with twice the output of the latter.

The method is applicable not only to the continuous pickling of strip but also to conveyor processes on both ferrous and non-ferrous parts such as hollow-ware (domestic utensils) for enamelling, cartridge cases, bomb parts, food containers, wire in coils or strands, forgings and castings, stampings, rods and tubes. The jet principle lends itself to regeneration of the acid and reagents and at least two successful regenerating systems have already been developed.

A.S.M. Annual Meeting Notice

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the Statler Hotel, Cleveland, on Wednesday morning, Oct. 18, 1944. All members of the Society in good standing are privileged to attend and vote. **W. H. Eisenman, Secretary**

Cleveland, Ohio, August 15, 1944

Jeffries Elected a Battelle Trustee

ZAY JEFFRIES, noted scientist and a pioneer in tungsten metallurgy and in the development of high strength aluminum alloys, has been elected to the board of trustees of Battelle Institute, Columbus, Ohio. Dr. Jeffries is technical director of the lamp department of General Electric Co., Cleveland; chairman, Carboloy Company, Inc.; vice-chairman of the War Metallurgy Committee of the National Academy of Sciences and National Research Council, and a past national president of the American Society for Metals.

Two Changes in ASM Constitution To Be Voted

Two changes in the Constitution and By-Laws of the American Society for Metals were proposed at a recent meeting of the Board of Trustees and will be voted upon at the annual meeting of the Society to be held in Cleveland on Oct. 18, 1944.

These changes specify that the number of members on the national nominating committee be increased from seven to nine, and that the nomination of national secretary of the Society should be made by a committee of past presidents meeting during the same week as the meeting of the nominating committee for the other national officers.

Article IX of the Constitution is reprinted below with the proposed changes in wording indicated by bold face type.

Article IX. Nomination, Election and Term of Officers

Section 1 (a). Selection of **Committees for Nomination of Officers. A Nominating Committee shall be appointed each year.** Each local chapter in good standing which is eligible to have a member on the Nominating Committee shall annually select one candidate for a Nominating Committee from the local chapter membership in such manner as the local chapter shall deem fit, and the name of the candidate shall be forwarded to the President prior to March 1st of each year. From the list of eligible candidates suggested by the various local chapters, the President shall appoint a Nominating Committee of **nine (9) members.** In appointing the Nominating Committee the President shall select members thereof in such a regional manner as to be equitable for all chapters of the Society. Any chapter having a member on the Nominating Committee in any given year shall not be eligible to have a member on the Nominating Committee during the two succeeding years and no member of the Nominating Committee may serve two or more successive years. The President shall designate one of the members of the Nominating Committee as Chairman of the Committee. **Seven (7)** members of the Nominating Committee shall constitute a quorum.

A Committee for Nomination of a Secretary for the Society shall be appointed each year in which the term of office of the Secretary expires. It shall consist of seven (7) members. The President shall be a member and shall serve as Chairman of the Committee for Nomination of a Secretary, and shall appoint the six (6) remaining members. The President shall appoint as members of the Committee the six (6) persons who have most recently held the office of President and who are living. In the event that there are fewer than six (6) of the past presidents of the Society who are living and qualified to serve on the Committee for Nomination of a Secretary, any other member or the representative of any member of the Society shall be eligible for membership thereon. Five (5) members of the Committee shall constitute a quorum.

Prior to April 15th of each year, the names of the Nominating Committee and of the Committee for Nomination of a Secretary for the Society, if any, shall be published by the President for the benefit of the members of the Society in one of the publications of the Society. **If for any reason there should be a vacancy on either the Nominating Committee or the Committee for Nomination of a Secretary, after appointment and before the conclusion of its duties, the President shall fill such vacancy by appointment of any person who would originally have been eligible to serve in the place created by such vacancy.**

(b) Duties of Nominating Committee **and Committee for Nomination of a Secretary.** On any day during the third full week in the month of May, the Nominating Committee shall meet at a place designated by the Chairman and shall name one candidate for each office which shall become vacant at the close of the next succeeding annual meeting of the members, **except for the office of Secretary. During the same period in each year in which the term of office of the Secretary expires, the Committee for Nomination of a Secretary for the Society shall meet at a place designated by its Chairman and shall name one candidate for the office of Secretary.** As an aid in making nominations, **each** Committee, and particularly the Chairman of the Committee, may canvass the executive committees of local chapters for written endorsements for consideration by the Committee. **Each** Committee shall also give consideration to written endorsements forwarded **to it for its consideration** by individual members or representatives of members of the Society. Endorsements **submitted by** a local executive committee **to the Nominating Committee** shall be confined to members of its local chapter or representatives of firms or corporations which are members of its local chapter, but an individual member or representative of a member of the Society may suggest any qualified members or representatives of members of the Society for consideration by the Nominating Committee. Immediately after the candidates are thus nominated, **each Committee** shall report the names of **its** nominees to the Secretary **of the Society** and the report shall be published by the Secretary in one of the publications of the Society not later than June 15th of the same year.

(c) Additional Nominations. **After publication of the names of the candidates nominated by the Nominating Committee and by the Committee for Nomination of a Secretary for the Society, if any,** and at any time prior to July 15th of the same year, additional nominations for any or all of the vacancies may be made by written communications addressed to the Secretary of the Society and signed by any fifty (50) members and/or representatives of member firms or corporations.

(d) Voting at Annual Meetings. If no such additional nominations are received prior to July 15th, nominations shall be closed and the Secretary, at the next succeeding annual meeting of the members, shall cast the unanimous vote of all members for the election of the candidates so nominated.

(e) Voting at Special Meeting. If the Secretary receives additional nominations for officers of the Society prior to July 15th, the Secretary shall call a special meeting of the members to vote on all candidates nominated by such communications and all candidates nominated by the Nominating Committee **and by the Committee for Nomination of a Secretary for the Society, if any.** The special meeting shall be held prior to the annual meeting, and forms of proxies for voting at such special meeting shall be mailed by the Secretary to each member or to each representative of a member firm or corporation at least thirty (30) days prior to the date fixed for such special meeting.

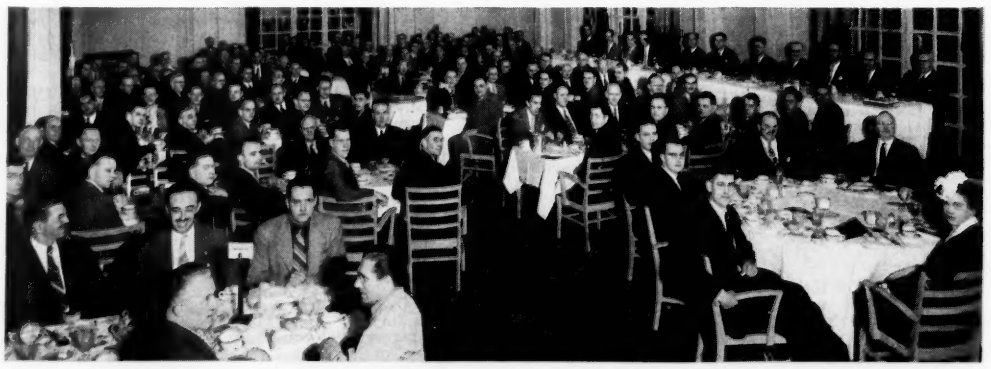
(f) Procedure for Voting. All votes for officers shall be counted by the Committee of Tellers. The candidates for the respective offices who receive a plurality of the votes cast shall be the duly elected officers of the Society, and shall be so certified by the Committee of Tellers immediately upon completion of the count, and such certification shall forthwith be filed with the Secretary of the Society.

(g) No nominations for officers shall be permitted except as herein specifically provided.

Barber Machinery Co. Named Representative

The Eastern Machine Screw Corp., New Haven, Conn., has announced the appointment of F. F. Barber Machinery Co. as Canadian representative with offices in Toronto, Windsor, and Montreal.

Celebrate Silver Anniversary With 12 Charter Members



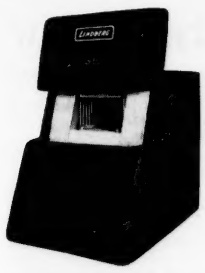
Seated at the Speakers' Table for the 25th Anniversary Dinner of the North West Chapter were F. H. Faber, Chairman of the Chapter's Membership Committee; A. A. Gustafson, Chairman of the 25th Anniversary Committee; W. E. Boker, President of the Local Chapter of the American Society of Tool Engineers; LeRoy D. Wolff, Chairman-Elect, North West Chapter; Ray T. Bayless, Assistant Secretary of the A.S.M. in Cleveland; Leonard Mayeron, Chapter Chairman; Ralph L. Dowdell, Master of Ceremonies (Charter Member and Past Chapter Chairman); Thomas J. Moore, President, Minneapolis Civic & Commerce Association; P. L. Covell, President, Engineers Club of Minneapolis; C. M. Underwood, Chairman, Northwest Section, American Welding Society; Alexis Caswell, Secretary-Treasurer, North West Chapter A.S.M.

Reported by Charles A. Nagler
Metallurgist, Twin Cities Ordnance Plant

All but one of the 13 men who attended the organization meeting of the North West Chapter A.S.M. held at the Radisson Hotel 25 years ago were present at the Chapter's Silver Anniversary Banquet held in the same hotel on May 24, 1944.

The original meeting was attended by A. E. Anderson, W. G. Barstow, H. K. Briggs, R. L. Dowdell, W. S. Getchell, O. E. Harder, W. E. Johnston, C. S. Moody, J. D. Mooney, S. J. Pfaff, W. I. Sweet, H. H. Wade, E. O. Wistrand. Dr. Harder was unable to be present for the anniversary party.

The meeting was attended by 20 of the past chairmen, and greetings from headquarters were conveyed by National Assistant Secretary Ray T. Bayless.



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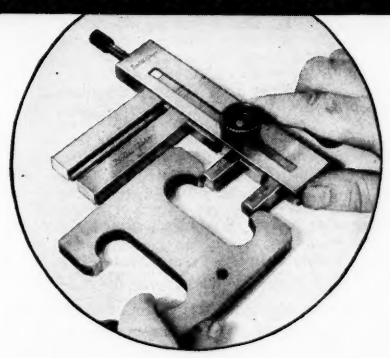

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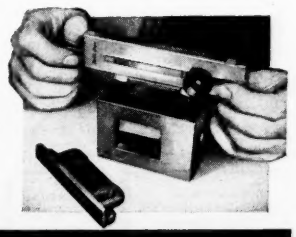

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Metal Literature Review

12. TESTING AND INSPECTION (*Cont.*)

12-159. The Metallographic Examination of Aluminum-Rich Alloys. N. H. Mason, G. J. Metcalfe and B. W. Mott. Institute of Metals *Journal*, v. 70, May '44, pp. 197-213.

Procedure adopted at Royal Aircraft Establishment; Type of microscope, method of illumination of the specimen, and methods of mounting and polishing specimens of alloys of different types. Some microstructural characteristics of cast and wrought commercial alloys are described, with particular reference to defects that have risen during manufacture or that have developed in use. 15 ref.

12-160. Low-Powered Radiography of Thin Steel Sections. Robert Taylor. *Steel*, v. 115, July 10, '44, p. 110.

When inspection must be facilitated and when higher powered equipment is not available, suitable radiographs can be secured by utilizing lower powered units in exposures with calcium tungstate intensifying screens.

12-161. Accurate Inspection of Magnesium Alloy Castings. Robert Taylor. *Iron Age*, v. 154, July 13, '44, pp. 55-58.

Correlation of X-ray testing, metallographic inspection and subsequent operations that will eliminate peripheral defects.

12-162. Non-Destructive Testing. *Automobile Engineer*, v. 34, May '44, p. 181.

Magnetic induction methods for non-ferrous, semi-finished metal products.

12-163. Inspection Without Gauges. *Machinery* (London), v. 64, June 8, '44, pp. 631-632.

Rapid method of checking components.

12-164. Radiographing Magnesium Alloy Test Bars. Robert Taylor. *Iron Age*, v. 154, July 20, '44, pp. 74-75, 151.

Radiographic inspection affords a means of knowing before the physical test is applied that the bar represents sound material; enables establishing standards upon which to base results of failure.

12-165. Increasing Production Efficiency with Tool Life Tests. L. L. Thill and E. B. Fremon. *Tool Engineer*, v. 14, June '44, pp. 93-94.

Report on the results of a large-scale tool life test conducted on automatic screw machines in actual production. Under identical test conditions, wide variations in results occur. Accuracy of results depends upon the number of tool changes in a test. Data on the life expectancy of cutting tools may be useful in setting up production operations for greater efficiency and lower costs.

12-166. Wrench Torque Nomogram for Aircraft Nuts. R. R. Wiese. *Product Engineering*, v. 15, July '44, pp. 503-504.

Table gives ultimate tensile strength, ultimate strength in single shear, and maximum bearing values for aircraft AN steel bolts used to fasten two or more sheets in a tension joint or connection, in which the bolts are subjected to shearing loads at sections lying in the plane of the sheet junctures and also bearing loads on the bolt body in contact with the sheets.

12-167. Radiography of Non-Uniform Sections. Robert Taylor. *Metals & Alloys*, v. 19, June '44, pp. 1393-1395.

Details of a recently developed single-exposure technique using two suitably chosen films in one holder that is expected to save much operating time. 4 ref.

12-168. High Speed X-ray on Conveyor Line at Fisher Body. Lloyd Lenox. *Modern Industrial Press*, v. 6, June '44, pp. 17-18.

The perfection of high speed X-ray equipment, which fits right into the production line and "pictures" as many as 40 parts a minute, marks the biggest step yet toward practical, universal X-ray inspection.

12-169. Applying Creep Data in Design. Joseph Marin. *Machine Design*, v. 16, July '44, pp. 123-126, 182.

Factors influencing creep, the methods of interpretation of creep tests, and the design of members subjected to creep.

12-170. Specifying Steel on Hardenability. L. L. Ferrall. *Steel*, v. 115, July 17, '44, pp. 106-109, 150, 152, 154.

Steelmakers can work to controlled hardenability but must be allowed wider composition limits to permit adjustment of individual elements at time of melting.

12-171. Specifying Steel by Performance. Greswold Van Dyke. *Machinery*, v. 50, July '44, pp. 206-207.

How a new method for determining steel performance came to be adopted; principle of the Jominy test.

12-172. Fatigue Tests of Parts Made Basis for Design. H. O. Boyvey. *Product Engineering*, v. 15, July '44, pp. 444-448.

Fatigue testing methods were developed to provide design criteria when certain aircraft parts failed, even when designed to carry a static load 50% greater than the maximum expected load. "Fatigue limits" based on performance of representative parts, and arbitrary estimates of fatigue loads establish safe values for design.

12-173. Magnetic Analysis. K. Hoselitz. *Iron & Steel*, v. 17, May 18, '44, pp. 433-435.

Determining the Fe-Ni phase diagram and the effects of cold work.

12-174. Defects in Light-Alloy Sheet and Strip. Light *Metals*, v. 7, June '44, pp. 259-262.

Detailed analysis of surface defects, their causes, prevention and cure.

12-175. Industrial Fluoroscopic Inspection. Robert Taylor. *Steel*, v. 115, July 24, '44, pp. 80-81, 124-127.

Applications, equipment and shortcomings of visual inspection by fluoroscopy. Method not suitable at present for inspection of ferrous metals although high-powered machines may make it possible to inspect thin steel sections.

12-176. How the Navy Specifies Steel. E. G. Touceda. *Steel*, v. 115, July 24, '44, pp. 103-106, 127-133.

Acceptability of steel for specific application. Endurance ratio below expectations. Statistical analysis of test data as applied to the development and improvement of steel specifications. Further research and method of attack.

(Continued on Page 6)

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Metal Literature Review

12. TESTING & INSPECTION (*cont.*)

12-177. **Fatigue Tests on Arc-Welded 3% Nickel Steel.** F. W. Thorne, A. Hunter and A. J. Hipperson. *Welding Journal*, v. 23, July '44, pp. 357-360s.

Tests carried out to determine the fatigue limit of butt joints welded with various types of electrodes, the plates being subject to different forms of heat treatment after welding.

12-178. **Practical Application of Stress Strain Theory.** F. C. Hoffman. *Aircraft Engineering*, v. 16, May '44, pp. 143-146.

If the limits to which parts can be formed by the common methods are known and applied, a very large percentage of parts can be designed so that they may be formed readily and economically using as few operations as possible.

12-179. **Notch-Toughness Tests of Carbon-Molybdenum Pipe Materials.** W. F. Kinney, I. A. Rohrig and H. S. Walker. American Society of Mechanical Engineers *Transactions*, v. 66, July '44, pp. 421-431.

Chemical composition, steel melting practice, and heat treating procedure, and their effects upon physical properties and microstructure are important factors in appraising the probable behavior of a material in service. Specific problem studied was to determine the influence on the uniformity of test results and on the magnitude of average notch-toughness values, both at room temperature and at 925° F., of three variables, namely (a) the type of specimen, (b) the heat of steel, and (c) the condition of steel.

12-180. **Damping Capacity.** Leopold Frommer and A. Murray. *Iron & Steel*, v. 17, June '44, pp. 494-497.

Non-destructive testing method at low stresses for light alloys and carbon steels.

12-181. **Shell Cases at Norris Stamping and Mfg. Co. Receive Rigid Inspections.** Gordon B. Ashmead. *Modern Industrial Press*, v. 6, July '44, pp. 16-18.

The bulk of inspection is accomplished right at the machine doing the operation. Each piece of work is assayed as each operation is completed.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-23. **Control of Heat Treatment.** A. H. Koch. *Industrial Gas*, v. 23, July '44, pp. 13-17, 30-38.

A high head temperature, importance of control of time, automatic control on furnaces, roller hearth, walking beam furnaces, walking beam popular for large pieces, methods of protecting surface of metals, inert nitrogen, ideal atmosphere, difficulties encountered with CG gas, Char-Mo atmosphere fills requirements, RX gas generator introduced, elimination of cleaning justifies cost, constant quenching temperature.

13-24. **Liquid Steel Temperatures.** D. Manterfield. *Iron & Steel*, v. 17, May 18, '44, pp. 422-424.

Pyrometric survey of the variations in basic open-hearth furnaces.

13-25. **Barrier-Layer Cells.** T. Land. *Iron & Steel*, v. 17, May 18, '44, pp. 462-466.

Use of photoelectric cells for foundry temperature measurements.

13-26. **Selenium Cells.** J. A. Hall. *Iron & Steel*, v. 17, May 18, '44, pp. 467-468.

Drift in relation to temperature measurement.

13-27. **Hot Metals.** D. J. Price and H. Lowery. *Iron & Steel*, v. 17, May 18, '44, pp. 469-473.

Emissivity characteristics, with special reference to the infra-red. 64 ref.

13-28. **Liquid Steel Temperatures.** D. A. Oliver and T. Land. *Iron & Steel*, v. 17, May 18, '44, pp. 474-475.

Thermocouple method for their measurement in casting streams.

14. FOUNDRY PRACTICE AND APPLIANCES

14-238. **Centrifugal Castings.** Peter Blackwood and John Perkins. *Canadian Metals and Metallurgical Industries*, v. 7, June '44, pp. 26-33.

Outstanding developments in production; dry sand spinning; die mould spinning; green sand spinning.

14-239. **Metallurgy in the Non-Ferrous Foundry.** A. C. Boak. *Canadian Metals and Metallurgical Industries*, v. 7, June '44, pp. 34-37.

Results of oxidation.

14-240. **Shrinkage and Porosity in Light Iron Castings.** C. A. Payne. *Foundry Trade Journal*, v. 73, May 11, '44, pp. 23-29.

Bearing of variable factors of casting of metals on the occurrence of shrinkage and porosity.

14-241. **Tests Temperature Attained Within Specimens of Molding and Core Sands.** D. C. Williams. *American Foundryman*, v. 6, July '44, pp. 5-6.

Measuring elevated temperatures developed within molded sand specimens, both with and without the metal pin inserted in the center.

14-242. **Mechanical Handling in Foundries.** Institute of British Foundrymen Advance Copy 794, June 10, '44, 14 pp.

Stockyard, stockyard to melting furnaces, molten metal, moulding sand, moulds, core sand and cores, heat treatment, fettling shop, inspection, storage and despatch.

14-243. **Wartime Calls on Women to Make Aluminum Air-Cooled Cylinder Heads.** M. J. Gregory. Institute of British Foundrymen Advance Copy 804, June 10, '44, 18 pp.

Foundry designed to use women, development of practices and design, evolution of the new foundry, variations of new procedure, gating considerations, sand handling, dry sands before storing, sand mixing, making body cores, making small cores, core assembling, properties of alloy used, gating practice, melting department, pouring practice, control of metal, remelting practice, cleaning, heat treating department, heat treating practice, final operations.

Employment Bureau

Address answers care of American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a statement of availability, if employed in an essential activity.

Positions Open

SALES ENGINEER: To specialize in the sale of sheet metal products in the heat and corrosion resistance fields. Must be familiar with the metallurgy and applications of the chromium-nickel alloys. Box 8-5.

METALLURGICAL ENGINEER: Required by eastern distributor of alloy steels, for promotional and development work. Must have knowledge of stainless steel mill practice and stainless steel applications. State age, education, experience, draft status, availability, and salary expected. Replies strictly confidential. Box 8-10.

SPINNING ROOM FOREMAN: For old, established New England firm manufacturing home electrical appliances. Experienced on all types of metals and metal spinning. State age, experience, marital status, and salary. Box 8-15.

ASSISTANT PROFESSOR OF METALLURGY: With sound fundamental training in physical metallurgy and some experience in industrial work and research, for teaching and research on staff of eastern university. Applicant with doctor's degree preferred. Box 8-20.

METALLURGIST: With complete knowledge of all types of tool steels, wanted by reputable independent warehouse in midwest with good prospects for post-war future. State experience, references, age and salary. Letters strictly confidential. Box 8-25.

MAN to take charge of sheet metal fabrication plant located in western Pennsylvania employing 300 men. Excellent post-war future. Must be capable of taking full charge of production and of supervising all phases of sheet metal fabrication, as well as ability to act as tool engineer in setting up new production lines. Give complete details as to experience, education, draft status, etc. Box 8-30.

METALLURGIST, for New York City plant engaged in manufacturing precision castings. Excellent post-war possibilities for right man. Must have at least five years' shop experience including knowledge of melting and heat treatment, especially of ferrous alloys. Liberal salary. Submit resume covering full experience, earnings and salary desired. Box 8-80.

ASSISTANT METALLURGIST: Wanted by leading stainless steel industry in east, to supervise new creep testing equipment. College graduate, experienced in mechanical and metallurgical engineering, between ages of 24 and 35. Attractive salary and good working conditions. Box 8-75.

METALLURGISTS who are giving wise consideration to their post-war chances in industry should consider our induction hardening field. We need engineers to construct, test and improve our unique Tocco hardening machines for post-war business. Five years' laboratory experience is preferred, but more essential is a will to work hard and plan well. Write Ohio Crankshaft, 3800 Harvard Ave., Cleveland, Ohio.

ASSISTANT METALLURGIST: For gray iron producer in Colorado. Must know qualitative and quantitative chemistry and run routine analysis; preferably with knowledge of cupola operations and foundry sands. Give qualifications, availability and salary expected. Box 8-85.

Positions Wanted

METALLURGIST: Age 30, degree in metallurgical engineering at Melbourne University, Australia. Would like position in U. S. A. in firm producing malleable iron. Developed production of pearlitic malleable iron for first time in Australia. Experience also includes welding research and general experience in melting, forging and heat treatment of alloy steels. Box 8-35.

METALLURGIST: Age 33, married, B.S. in chemical engineering, University of Michigan, draft status 2B. Four years' experience in quality control for manufacturer of passenger car bodies, five years in manufacture of automotive accessories, particularly bearings. Familiar with development of processes, design, purchase, and installation of production metallurgical equipment, supervision of control laboratory and establishment of inspection standards. Would like position combining mass production experience with sound engineering background. Box 8-40.

METALLURGICAL ENGINEER: Recent honorable discharge from service; age 32; married. Ten years' experience on steels, stainless, and some non-ferrous. Desires employment with reliable company with post-war opportunity. Box 8-45.

HEAT TREAT SUPERVISOR: Ten years' experience on tools, dies, and production parts. Excellent knowledge of metallurgy, metallography, physical testing, and processing. Midwest preferred. Box 8-50.

METALLURGIST: Graduate with eight years' industrial experience in production and research. Desires connection as chief metallurgist or supervisory capacity. Diversified knowledge and experience with both ferrous and non-ferrous metals. Recent experience includes design and organization of a complete metallurgical laboratory. Territory optional. Box 8-55.

METALLURGIST-ENGINEER: B.S. in metallurgical engineering; age 30; occupationally deferred. Desires position as chief metallurgist or metallurgical engineer with definite post-war future. Experiences: Maintenance metallurgical engineer, purchasing, open-hearth metallurgist, bessemer metallurgist, rolling mill metallurgist, pipe manufacture, metallography, statistics. Box 8-60.

GRADUATE in metallurgical engineering from a leading eastern university, age 27. Four years' experience in heat treating, specifications, and physical testing of carbon and alloy steel forgings. Limited experience in treatment of tool steel and mill products. Desires position with post-war future in production or industrial research. Box 8-65.

(Continued on page 18, Column 1)

Metal Literature Review

14-244. **Defects in Magnesium Castings from Poor Heat Treatment.** Roy B. McCauley and L. F. Mondolfo. *Metal Progress*, v. 46, July '44, pp. 84-87.

Lack of solution; eutectic melting; high temperature deterioration; warpage; grain growth.

14-245. **New Gray Iron Foundry Has Interesting Features.** Edwin Bremer. *Foundry*, v. 72, July '44, pp. 70-73, 201-202, 204, 206.

Numerous features of the foundry include method of ventilation, mold shakeout, sand handling, and progressive flow from raw materials to finished casting.

14-246. **Bronze Foundry Exercises Close Control.** R. T. Covington. *Foundry*, v. 72, July '44, 76-78, 198, 200.

Layout and equipment to produce best product for war needs.

14-247. **Graphite Rods Applied to Open Risers.** Frank J. Vosburgh and Harold L. Larson. *Foundry*, v. 72, July '44, pp. 74-75, 180, 182, 184, 196.

Farrell-Cheek Steel Co. increased casting yields by applying the method of using small graphite rods in their standard open risers.

14-248. **Trends in the Foundry Industry.** Fred J. Walls. *Foundry*, v. 72, July '44, pp. 79, 208.

Engineering requirements in castings govern the trends in the foundry industry. Fundamentally, changes in these requirements, as demanded by the casting consumer, are based on the economics of obtaining certain desirable physical and mechanical characteristics.

14-249. **Dodge Aluminum Foundry Has Flexibility.** A. H. Allen. *Foundry*, v. 72, July '44, pp. 80-82, 178.

By having five separate but complete foundry units, as many as five different alloys can be cast simultaneously.

14-250. **Cupola Raw Materials.** H. W. Gillett. *Foundry*, v. 72, July '44, pp. 88, 216, 218, 220.

Tests for coke properties, briquetting of chips and borings, use of coke as a bonding agent in that process, and cupola fluxes.

14-251. **Melt Bronze in the Cupola.** Charles Gregg. *Foundry*, v. 72, July '44, pp. 89, 210, 212, 214.

By controlling and measuring the air blast, measuring the coke bed height, and amount in the charges, the melting or resulting temperature of bronze in the hearth can be controlled closely.

14-252. **Mechanical Aids to Core Production.** J. Blakiston. *Foundry Trade Journal*, v. 73, May 18, '44, pp. 43-48, 56.

Position of the foundry industry in the light of mechanical advancement during the last century. 4 ref.

14-253. **Cupola Practice.** Donald J. Reese. *Foundry Trade Journal*, v. 73, May 18, '44, pp. 49-54.

Phases of cupola practice worth checking. Any deficiencies in the standards outlined should be made good.

14-254. **Utility Briquettes from Waste Slack.** H. B. Farmer. *Foundry Trade Journal*, v. 73, May 18, '44, pp. 55-56.

Substitute for large coal in foundry processes.

14-255. **Reclaiming Foundry Sand by the Wet Method.** William Reingering and Walter Horth. *Iron Age*, v. 154, July 6, '44, pp. 68-74.

New types of sands chosen; non-critical materials used; water saving and reclaimed water cycle.

14-256. **Small Die Castings Rapidly Made.** Herbert Chase. *Metals & Alloys*, v. 19, June '44, pp. 1388-1392.

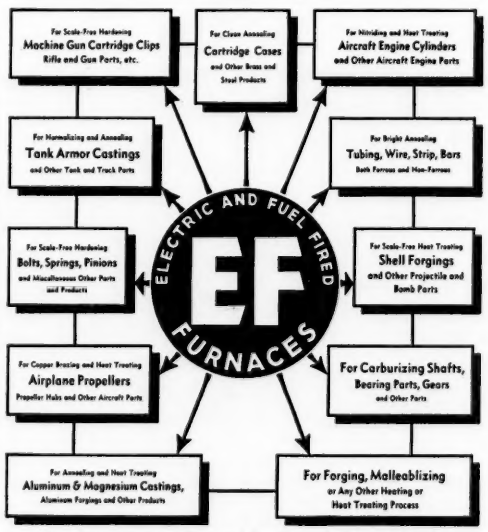
Method for making zinc alloy die castings as small as ⅛ x ⅛ in. at speeds of several hundred per min. Parts already in production include slide fastener components and other tiny articles.

14-257. **Design Rules. V.** Herbert Chase. *Die Casting*, v. 2, July '44, pp. 23-24, 63-65.

Specify the formation of holes or recesses by means of cores.

14-258. **Holding Their Own.** Edward Williams. *Die Casting*, v. 2, July '44, pp. 25-26, 28.

Undercuts are included in designs, in order to obtain necessary clearance for mechanisms.



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Metal Literature Review—*Continued*

14. FOUNDRY PRACTICE (*Cont.*)

14-259. Laboratory Precision. Lauren M. Burgess. *Die Casting*, v. 2, July '44, pp. 46-50.

When the quantity of parts required is so small as not to warrant the cost of a two-or-more cavity die, it is often possible for the die caster to make parts for several customers at one time in the same die casting machine.

14-260. Graphic Cost Analyses Guide Selection of Casting Method. *Product Engineering*, v. 15, July '44, pp. 484-488.

Effect of quantity on costs of casting various parts by different methods is shown graphically and detailed costs for producing the finished part are tabulated. By means of such analyses for various quantities of typical designs, little time is required to determine the most economical method for production of any specified quantity of a given part.

14-261. Mechanical Aids to Core Production. J. Blakiston. *Foundry Trade Journal*, v. 73, May 25, '44, pp. 63-68.

Position of the foundry industry in the light of mechanical advancement during the last century. 1 ref.

14-262. Developments in the Design and Use of Side Blown Converter Plants. P. C. Fassotte. Iron & Steel Institute, Advance Copy, June '44, 10 pp.

A shortage of hematite iron led to a re-assessment of the relative importance of the Si and C reactions in the process. The C reaction leads essentially to the formation of CO_2. The temperature increment derived from this C combustion is such that the reaction may be relied upon principally to produce the final steel temperature. Plants were built in such a way that Si could be largely dispensed with, with the concomitant elimination of hematite from the cupola charges. The operation of such a plant is discussed.

14-263. The Effect of Grain Shape on the Moulding Properties of Synthetic Moulding Sands. W. Davies and W. J. Rees. Iron & Steel Institute, Advance Copy, June '44, 29 pp.

In sand having comparable mechanical gradings the strength of mixtures prepared with angular sands is lower than that of the dried mould or core. These differences are attributed to the poorer packing properties of the angular sands and to differences in the grain relationships in angular and rounded sands. The distribution of bulk density in moulds and cores is analysed, and the relationship of the bulk-density gradient to the moulding properties discussed and illustrated.

14-264. Malleable Mixture Calculation and Melting Control. M. E. McKinney. *Canadian Metals & Metallurgical Industries*, v. 7, July '44, pp. 29-32, 44-45.

Pig iron and scrap, mixture calculation, furnace control.

14-265. Founding in Aircraft Construction. *Light Metals*, v. 7, June '44, pp. 274, 275.

The simplification of moulding technique and stabilizing of production methods.

14-266. Moulding Sands and Gases in Relation to Casting Defects. G. W. Nicholls. *Foundry Trade Journal*, v. 73, June 1, '44, pp. 85-91.

Controlling factors in the satisfactory production of iron castings. 5 ref.

14-267. Some Principles of Melting Malleable Iron. H. A. Schwartz. *Foundry Trade Journal*, v. 73, June 1, '44, pp. 93-95.

Principles which limit the temperature obtainable in a furnace.

14-268. The Injection of Metal into Die Casting Dies. H. K. Barton. *Machinery*, (London) v. 64, May 25, '44, pp. 581-583.

Typical example; behavior of standard alloys.

14-269. Moulding Sands and Gases in Relation to Casting Defects. G. W. Nicholls. *Foundry Trade Journal*, v. 73, June 8, '44, pp. 111-114, 116.

Controlling factors in the satisfactory production of iron castings.

16. FURNACES AND FUELS

16-88. High Frequency Induction Heating. G. E. Shaad. *Iron & Steel Engineer*, v. 21, June '44, pp. 66-73, 88.

Induction heating offers advantages that justify its use in many applications.

16-89. Pulverized Coal Firing of Metallurgical Furnaces. L. S. Wilcoxson. *Iron & Steel Engineer*, v. 21, June '44, pp. 74-85, 88.

Applications of pulverized coal to heating operations in the iron and steel industry.

16-90. Blast Furnace Tap Hole Area. C. F. Hoffman. *Steel*, v. 114, June 26, '44, pp. 119-220.

Severe erosion of brickwork beneath iron notch occurs when cast iron segments with cast-in pipes are employed for cooling. Condition is eliminated by installing jackets and coolers in well and then driving bottom blocks, carefully sized and properly cut and ground, into position.

16-91. Steam in Steelworks—II. G. Graham. *Iron & Steel*, v. 17, May '44, pp. 353-359.

The ever-changing supply situation necessitates alterations in some of the methods to meet temporary difficulties in obtaining materials. Ways by which quick returns are obtainable in the fight for fuel efficiency. Parallel slide and other values are dealt with; insulating steam pipes in forges.

16-92. Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces. Wallace G. Imhoff. *Industrial Gas*, v. 23, July '44, pp. 20, 38, 40, 42.

Fuels from the viewpoint of heating hot-dip galvanizing furnaces: Electric heat.

16-93. High-Frequency Heating in Industry. *Westinghouse Engineer*, v. 4, July '44, pp. 105-110.

Eddy currents, skin effect, and dielectric loss; characteristics harnessed. In the field of metal melting, brazing, soldering, hardening, and curing, the operations are being done better or faster, and many cannot be done by any other method.

16-94. Open-Hearth Furnaces. A. H. Leckie. *Iron & Steel*, v. 17, May 18, '44, pp. 399-404.

A method for investigating the performance of open-hearth furnaces by the statistical examination of routine works records. How appropriate correlation methods may be used to determine the optimum gas rate and air-gas ratio, and to investigate the effect of many variables in a quantitative way and the changes in thermal efficiency under various conditions. Simple methods of measuring and calculating the quantities involved.

16-95. Mixed Gas Heating. R. W. Evans. *Iron & Steel*, v. 17, May 18, '44, pp. 415-419.

Open-hearth firing with coke oven and blast furnace gas mixtures.

16-96. Pulverized Coal Firing of Malleable Iron Annealing Kilns. *Industrial Heating*, v. 11, July '44, pp. 1092, 1108.

Uses of pulverized coal as fuel in the malleable industry with relation to melting furnaces. Need for larger combustion space with this fuel necessitated raising the roofs of the kilns.

16-97. Continuous Furnace Coordinates Heating and Handling of Copper Bars. *Industrial Heating*, v. 11, July '44, pp. 1094, 1108.

A description of a continuous furnace designed to smooth production flow into and from the furnace so as to synchronize with the desired rate of charging and the rate of bar feed to the mill.

17. REFRACTORIES AND FURNACE MATERIALS

17-31. Basic Refractories for the Copper Industry. R. P. Heurer and A. E. Fitzgerald. II. *Metals & Alloys*, v. 19, June '44, pp. 1405-1408.

Basic converters.

17-32. Simple Method for Measuring Industrial Furnace Heat Losses. *Brick & Clay Record*, v. 105, July '44, pp. 42, 44, 46.

Charts simplify solution of heat transfer problems. All types of refractories can be studied. Conductivity factor must be known.

17-33. Rationalizing Thermal-Insulation Dimensions. Ray Thomas. *Mechanical Engineering*, v. 66, July '44, pp. 480-481.

Some advantages of having a simple, direct, and definite scheme with which to design and order pipe insulation.

17-34. Basic-Lined Ladles. N. L. Evans. *Iron & Steel*, v. 17, May 18, '44, pp. 409-412.

Use in the desulphurization of cast iron by sodium carbonate.

17-35. Refractories. Louis A. Smith. *Iron and Steel*, v. 17, June '44, pp. 491-493.

Steel plant problems of 1943 discussed.

17-36. Use of Permeable Refractories for Furnace Construction. R. H. Anderson, D. C. Gunn and A. L. Roberts. *Metallurgia*, v. 30, May '44, pp. 37, 38, 39, 40.

The use of permeable characteristics of refractories in order to increase furnace efficiency. Results of experimental work in a recent paper before the Institute of Fuel.

18. HEAT TREATMENT

18-134. Heat Treatment of Aluminum. J. O. Laws. *Iron Age*, v. 153, June 22, '44, pp. 58-60, 126.

Construction and operating data for a fully automatic unit used in aluminum heat treating in the aircraft industry.

18-135. Heat Treating High-Speed Steels in Salt Bath Furnaces. Haig Solakian. *Steel*, v. 114, June 26, '44, pp. 88-89, 111, 114, 116.

Care and attention to details and instructions for proper operation of the salt bath pay dividends in high quality products and low maintenance of equipment.

18-136. Processing Armorplate. *Steel*, v. 114, June 26, '44, pp. 122, 125-126, 135.

Speeded by newly developed continuous lines. Production sequence from raw material to fully machined, heat treated parts.

18-137. Water-Quenching Small Steel Castings. J. W. Juppenlatz. *Foundry*, v. 72, July '44, pp. 84-87, 174.

Thermocouples show three temperatures, controlled time quenching important.

18-138. Measurement of Case Depth by Hardness Gradient. Thomas C. Fazio. *Metal Progress*, v. 46, July, '44, pp. 89-90.

Case depths of carburized steels are usually obtained by carbon analyses of successive individual lathe or miller cuts which vary from 0.005 to 0.015 in. deep. Accurate means of measuring C penetration.

18-139. Nitriding Steels for Large Tools for Plastic Molding. W. Haufe. *Kunststoffe*, v. 33, no. 6, June '43, pp. 151-158; *Engineers' Digest*, v. 1, June '44, pp. 406-408.

Influence of shape on the hardening stresses; nitriding; nitriding steels for molding tools.

18-140. Continuous Heat Treatment of Steel Bars. Irwin H. Such. *Steel*, v. 115, July 3, '44, pp. 84-85, 130, 132.

Each heat treating unit is a pair of induction heating coils for hardening and tempering, powered by standard Tocco 125 and 75-kilowatt, 9600-cycle motor-generator units, through which the bars are fed by three sets of drive rolls at speeds regulated by a speed control unit.

18-141. Principles of Heat Treating of Steels. T. F. O'Brien. *Steel Processing*, v. 30, June '44, pp. 361-363, 383.

Heat treating operations under two main headings: Hardening and annealing; also mechanical property charts, the process of heating steel and furnace atmosphere.

(Continued on Page 10)

JOMINY HARDENABILITY TEST
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A.S.M. TENTATIVE PROGRAM

National Metal Congress, Oct. 16-20— Headquarters at Statler and Hollenden Hotels, Cleveland

HERE is the tentative program of the American Society for Metals for the National Metal Congress in Cleveland Oct. 16 to 20. All of the papers on the A.S.M. sessions will be preprinted for distribution to members.

The Society will print only 10% in excess of the number of orders for preprints in the office on press date and this excess 10% will be sent out as long as it lasts, but the Society will assume no obligation of forwarding preprints after this 10% excess supply has been exhausted. Please order only those preprints in which you are immediately interested because all papers listed for presentation will be printed, together with discussion, in future Society publications.

Order by number using the coupon below before Sept. 15, 1944. Only the numbered papers on this list are available from the American Society for Metals. Papers on the programs of the other cooperating societies should be ordered from the headquarters of the appropriate society.

As in former years, afternoons and evenings are left open on the A.S.M. program for a series of panel type group meetings — informal discussions of vital war and post-war problems in the metal industry. Subjects to be discussed will be listed in the September issue of THE METALS REVIEW.

Monday Morning, October 16

1. **A Comparison of Microhardness Indentation Tests,** by Douglas R. Tate, National Bureau of Standards.
2. **Improved Sensitivity in Double Exposure Radiography,** by James Rigbey, Ford Motor Company of Canada.
3. **The Interpretation of Radiographs: Particularly of Aircraft Parts,** by Leslie W. Ball, Triplett & Barton, Inc.

Simultaneous Session

4. **Rates of Tempering in Cobalt Steels,** by E. A. Loria, Carnegie-Illinois Steel Corp.
5. **Isothermal Transformation and End-Quench Hardenability of Some NE Steels,** by R. L. Rickett, J. G. Cutton, C. B. Bernhart, Jr., and J. R. Millikin, United States Steel Corp.
6. **Further Developments of the End-Quenched Hardenability Test,** by C. R. Wilks, Earnshaw Cook and Howard S. Avery, American Brake Shoe Co.
7. **A Hardenability Test for Low Carbon and Shallow Hardening Steels,** by O. W. McMullan, Youngstown Sheet & Tube Co.

Simultaneous Session

8. **A. Survey of Wrought Magnesium Alloy Fabrication,** by J. V. Winkler, Dow Chemical Co.
9. **The Copper-Manganese Equilibrium System,** by R. S. Dean, J. R. Long, T. R. Graham, E. V. Potter and E. T. Hayes, Bureau of Mines.
10. **Properties of Transitional Structure in Copper-Manganese Alloys,** by R. S. Dean, E. V. Potter and J. R. Long, Bureau of Mines.
11. **Age Hardening Copper-Manganese-Nickel Alloys,** by R. S. Dean, J. R. Long, T. R. Graham and C. W. Matthews, Bureau of Mines.

Tuesday Morning, October 17

12. **The Mechanism of Failure of 18 Cr, 8 Ni Cracking Still Tubes,** by C. L. Clark, Timken Roller Bearing Co., and J. W. Freeman, University of Michigan.
13. **Capillarity of Metallic Surfaces,** by E. R. Parker, University of California, and R. Smoluchowski, General Electric Co.
14. **The Effect of Fiber on Notched Bar Tensile Strength Properties of a Heat Treated Low Alloy Steel,** by G. Sachs, J. D. Lubahn, L. J. Ebert and E. L. Aul, Case School of Applied Science.
15. **The Effects of Notches of Varying Depth on the Strength of Heat Treated Low Alloy Steels,** by G. Sachs, J. D. Lubahn and L. J. Ebert, Case School of Applied Science.

American Society for Metals
7301 Euclid Ave., Cleveland 3, Ohio

Please send me the following preprints of 1944 A.S.M. convention papers:

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Simultaneous Session

16. **The Effect of Carbon Content on Hardenability,** by E. S. Rowland, J. Welchner, R. G. Hill and J. J. Russ, Timken Roller Bearing Co.
17. **Air-Hardenability of Steels,** by C. B. Post, M. C. Fetzer and W. H. Fenstermacher, Carpenter Steel Co.
18. **The Partition of Molybdenum in Steel and Its Relation to Hardenability,** by Fred E. Bowman, Climax Molybdenum Co.
19. **The Rate of Diffusion of Molybdenum in Austenite and in Ferrite,** by John L. Ham, Climax Molybdenum Co.

Simultaneous Session

20. **New Developments in High Strength Aluminum Alloy Products,** by E. H. Dix, Jr., Aluminum Company of America.
21. **Aluminum Alloy Forging Materials and Design,** by L. W. Davis, Aluminum Company of America.
22. **The Properties of Aluminum Alloys Melted in an Induction Heated Crucible Furnace,** by James W. Poynter, Army Air Forces, Wright Field.
23. **Magnesium Sheet,** by P. T. Stroup and G. F. Sager, Aluminum Company of America, and J. B. West, American Magnesium Corp.

Wednesday Morning, October 18

Annual Meeting of American Society for Metals

Edward de Mille Campbell Memorial Lecture, by G. R. Fitterer, Professor and Head, Department of Metallurgical Engineering, University of Pittsburgh.

Thursday Morning, October 19

24. **A Comparison of Aluminum and Titanium Deoxidation for Preventing Strain Aging Embrittlement in Low Carbon Steel,** by G. F. Comstock and J. R. Lewis, Titanium Alloy Manufacturing Co.
25. **Notes on the Ar' Reaction in Some Iron-Cobalt Tungsten Alloys,** by W. P. Sykes, General Electric Co.
26. **The Basic Electric Melting Procedure for High Quality Alloy Steels,** by A. L. Ascik, Sorel Industries Limited.

Simultaneous Session

27. **The Dimensional Stability of Steel—Part I—Subatmospheric Transformation of Retained Austenite,** by S. G. Fletcher and Morris Cohen, Massachusetts Institute of Technology.
28. **A Study of Subzero Treatments Applied to Molybdenum-Tungsten High Speed Steel,** by R. G. Kennedy, Jr., Cleveland Twist Drill Co.
29. **Experiments of Sodium Cyaniding of High Speed Steel Prior to Hardening,** by John McIntyre, International Business Machines Co.

Simultaneous Session

30. **Practical Aspects of the Selection of Frequency and Time Cycles for the Processing of Metallic Parts with Induction Heating,** by W. E. Benningoff and H. B. Osborn, Jr., Ohio Crankshaft Co.
31. **Induction Hardening of Plain Carbon Steels,** by D. L. Martin and F. E. Wiley, General Electric Co.
32. **Shot for Metal Peening,** by O. E. Harder and J. T. Gow, Battelle Memorial Institute.

Friday Morning, October 20

33. **Chromium Steels of Low Carbon Content,** by Russell Franks, Union Carbide and Carbon Research Labs.
34. **Characteristics and Properties of Some Cast Chromium-Molybdenum Steels,** by N. A. Ziegler and W. L. Meinhart, Crane Co.
35. **The Segregation of Molybdenum in Phosphorus Bearing Alloyed Gray Cast Iron,** by F. B. Rote, Wyman-Gordon Co. and W. P. Wood, University of Michigan.

Simultaneous Session

36. **Fractography—A New Tool for Metallurgical Research,** by Carl A. Zapffe and Mason Clogg, Jr., Rustless Iron and Steel Corp.
37. **Cleavage Structures of Iron-Silicon Alloys,** by Carl A. Zapffe and Mason Clogg, Jr., Rustless Iron and Steel Corp.
38. **Grain Shape and Grain Growth,** by David Harker, General Electric Co., and Earl R. Parker, University of California.
39. **Fracture Studies of Soldered Joints,** by F. Berman and R. H. Harrington, General Electric Co.

Simultaneous Session

40. **Annealing Studies on Cold-Rolled Iron and Iron Binary Alloys,** by C. R. Austin, L. A. Luini and R. W. Lindsay, Pennsylvania State College.
41. **The Effect of Cold Rolling on the Structure of Hadfield Manganese Steel,** by Norman P. Goss, Cold Metal Products Co.
42. **Factors Controlling Graphitization of Carbon Steels at Subcritical Temperatures,** by C. R. Austin, Pennsylvania State College, and M. C. Fetzer, Carpenter Steel Co.

Willson Joins Halliburton Oil Well Cementing Co.

P. L. WILLSON has resigned as consulting engineer, Spartan Aircraft Co., Tulsa, Okla., to join the Halliburton Oil Well Cementing Co., Duncan, Okla., as consultant in matters of metals and processes. A past chairman of the Tulsa Chapter A.S.M., he will now divide his loyalties between that group and the new North Texas Chapter.

A.I.M.E. Announces Plans for Fall Meeting During Metal Congress

For the 17th consecutive year the Institute of Metals Division and the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers will cooperate with the American Society for Metals, the American Welding Society, and other technical groups in holding their regular fall meeting in Cleveland during the first three days (Oct. 16 through 18) of the National Metal Congress. The headquarters for the A.I.M.E. group will be the Statler Hotel, where the technical sessions and the annual dinner and reception will be held.

Institute of Metals Technical Program

The high spot of the Institute of Metals Division technical program is the symposium on creep of nonferrous alloys arranged by Henry L. Burghoff, research metallurgist, Chase Brass and Copper Co. Also of much interest will be the session on grain size of magnesium casting alloys. This is being arranged by E. A. Anderson, chief of the metal section, research department, New Jersey Zinc Co.

The Institute of Metals Division will also have its usual quota of important papers on various alloys and on physical metallurgy, and there will be a special session on the metallurgy of beryllium, tin, cadmium, antimony, and quicksilver production.

Iron and Steel Technical Program

Two symposia will feature the Iron and Steel Division sessions: One on deoxidation of open-hearth steel, arranged by T. S. Washburn, assistant chief metallurgist, Inland Steel Co., and chairman of the Division's Physical Chemistry of Steelmaking Committee; and one on recent developments in dilatometric analysis, arranged by F. M. Walters, Jr., superintendent of physical metallurgy, Naval Research Laboratory, Washington. In addition there will be papers on hardenability and other phases of physical metallurgy.

Special Features

The annual dinner will be on Tuesday evening, with Arthur Phillips, chairman of the Institute of Metals Division, as toastmaster. W. P. Sykes, chairman of the Cleveland Section, will welcome the members and guests, and William A. Haven, chairman of the Iron and Steel Division, will make the response. The dinner speaker will be James F. Lincoln, president of the Lincoln Electric Co.

The dinner will be preceded by a reception given with the compliments of local members of the Institute and arranged by the local committee under the chairmanship of Prof. K. H. Donaldson, Case School of Applied Science. Other members of the local committee for the Cleveland meeting are William A. Haven, Carl E. Swartz, W. P. Sykes, and C. L. Wyman.

Radium and X-Ray Society To Meet Thursday and Friday

The first convention and technical meeting of the newly organized American Industrial Radium and X-Ray Society will be held in Cleveland, Oct. 19 and 20, concurrently with the National Metal Congress. Some ten or 12 papers on various phases of industrial radium and X-ray applications are planned for technical sessions on Thursday morning, Oct. 19 and on Friday morning and afternoon.

On Thursday afternoon is scheduled the annual meeting of the Society, to be followed by the presentation of the Robert F. Mehl Lecture by George L. Clark, head of the department of chemistry at the University of Illinois, whose subject will be "Experimental Stress Analysis in Radiographically Sound Materials."

These sessions will be preceded on Monday evening, Oct. 16, by a special meeting of the Cleveland Section of the Society, addressed by L. W. Ball of Triplett & Barton on "Use of Microradiography in Identifying Defects in Castings."

Headquarters for the American Industrial Radium and X-Ray Society during the Metal Congress will be at the Hollenden Hotel. The program is in charge of Roy W. Emerson, metallurgist, Pittsburgh Piping and Equipment Co., Pittsburgh, Pa. Philip D. Johnson is secretary of the Society with headquarters at 25 E. Washington St., Chicago 2, Ill. M. B. Evans, Ternstedt Mfg. Div., G. M. C., is president.

Stress Analysts Name Five Special Topics For October Meeting

At the invitation of the American Society for Metals the Society for Experimental Stress Analysis is holding its fall meeting in Cleveland Oct. 17 to 20 inclusive. This will enable the Society's members to attend the National Metal Congress and any technical sessions of other professional groups meeting in Cleveland at the same time. Since the activities of the Society cover an unusually broad field, a most cordial invitation is extended to all those attending the Congress or other professional meetings to take part in the technical sessions on experimental stress analysis.

The Society will have headquarters at the Carter Hotel where all its meetings will be held in the Ballroom. The program of technical papers has been arranged to cover many interesting applications and procedures, including the following topics which will be given special attention.

1. **Applications of Experimental Stress Analysis in the Aircraft Industry.**
2. **Problems of the Engine Builders Including Stress Analyses of Crankshafts and Other Parts.**
3. **Electronic Devices for Determining Stress Measurements.**
4. **New Techniques for Stress Analysis.**
5. **Electrical Aids for Determining Stress Distributions—Instruments and Instrumentation.**

The Society for Experimental Stress Analysis is a new group formed from the highly successful Photoelasticity Conferences, in response to a need for a common forum and meeting place for those individuals requiring strain measurements in the advancement of their profession. Within the past few years new methods of measuring strain have developed with great rapidity. The means are now available for solving many problems both static and dynamic which previously could not be adequately investigated.

The Society exists primarily to bring together the individuals concerned with the measurement of stresses (who in many cases are of necessity skilled electronic engineers) with the metallurgists, designers, and engineers by whom the knowledge of stress and its distribution is incoporated in the final structures. It is not expected that the new society will overlap the field of other well-established professional groups but rather that it will fill the need for an organization devoted to the promotion of research and a better understanding of stress distributions in all kinds of parts and structures.

The Society for Experimental Stress Analysis may be addressed at Central Square Station, P.O. Box 168, Cambridge 39, Mass. Membership is available both to individuals and corporations.

Volume 1, No. 1 (June 1943) and Volume 1, No. 2 (December 1943) of the *Proceedings* have already appeared, and may be obtained by non-members through direct purchase from the Society's publisher, Addison-Wesley Press, Inc., 513 Kendall Square Building, Cambridge, Mass.

Programs of the meeting will soon be distributed to the members of the Society and complimentary copies will be gladly mailed free of charge to all other interested parties whether they plan to be in Cleveland at the time of the meeting or not.

WELDING SOCIETY PROGRAM

Twenty-Fifth Annual Meeting, Oct. 16-19, Headquarters at Hotel Cleveland, Cleveland, Ohio

Monday, October 16

9:30 A.M.—Opening Session

Welding Aids the War Effort

Presentation of Medals and Prizes

Welding as an Aid in Shipbuilding Construction, by Admiral H. L. Vickery, U. S. Maritime Commission.
Welding as an Aid in the Fabrication of Ordnance Equipment, by Col. S. B. Ritchie, Office, Chief of Ordnance.
Welding in Aircraft Construction, by W. B. Stout, Consolidated Vultee Aircraft Corp.

2:00 P.M.—Welding and Cutting in Heavy Industries

Heavy Oxy-Acetylene Cutting, by G. L. Walker and H. G. Hughey, Air Reduction Sales Co.
Steel Mill Maintenance, by E. W. Gruber, Wheeling Steel Corp.
Unusual Applications of Gas Cutting in Ordnance Fabrication, by C. M. Underwood, Northern Ordnance, Inc.

2:00 P.M.—Railroad and Transportation

Welding of Aluminum Tank Cars, by A. H. Woollen, Railroad Sales, Aluminum Co. of America.
Railroad Maintenance Welding, by Clay W. Roberts, The Pennsylvania Railroad.
Railroad Welding, by John McMullen, Erie R. R.

2:00 P.M.—Weldability

Discussion of Weldability of Manganese Steel, by W. B. Brooks, Cramp Shipbuilding Co.
High Tensile Manganese-Silicon Steels for Welded Fabrication, by G. G. Luther and F. H. Laxar, Naval Research Lab.
The Bead-Weld Nick-Bend Test for Ductility, by C. E. Jackson and G. G. Luther, Naval Research Lab.
The Influence of Minor Variables of Weldability, by R. D. Stout, S. S. Tor and G. E. Doan, Lehigh University.

8:00 P.M.—Adams' Lecture

C. A. Adams' Lecture, by Dr. A. B. Kinzel, Union Carbide and Carbon Corp.

Tuesday, October 17

9:30 A.M.—Resistance Welding

Spot Welding Machines for Heavy Gauges of Ferrous and Non-Ferrous Metals, by Mario Sciaky, Sciaky Bros.
Heat Transfer Across Contact Surfaces, by W. B. Kouwenhoven, Dean, School of Engineering, Johns Hopkins University.
Roll Spot Welding, by B. L. Wise, Federal Machine and Welder Co.
Problems in Spot Welding Heavy Mild Steel Plate, by F. R. Hensel, E. I. Larsen and E. F. Holt, P. R. Mallory & Co., Inc.

9:30 A.M.—Research

The Effect of Postheating in Welding Medium Alloy Steels, by M. A. Pugacz and G. J. Siegel, Naval Research Laboratory.
Stress Relieving Study, by Prof. J. R. Stitt, Ohio State University.
The Effects of Metallurgical Changes Due to Heat Treatment Upon the Fatigue Strength of Carbon-Steel Plates, by W. H. Bruckner, and W. H. Munse, University of Illinois.

9:30 A.M.—Structural

Standard Details for Welded Building Construction, by H. W. Lawson, Bethlehem Steel Co.
Field Welded Pressure and Variable Volume Storage Tanks, by Fred L. Plummer, Hammond Iron Works.
Rigid Frame Structures, by Martin P. Korn.

2:00 P.M.—Resistance Welding

Low Reactance Cable for Resistance Welders, by Myron Zucker, Mackworth G. Rees, Inc.
The Flash Welding of Alloy Steels—Welding Techniques and Variables, by J. J. Riley.
Metallurgical and Physical Characteristics, by J. C. Barrett, Taylor-Winfield Corp.
Small Portable Condenser Welding Set, by E. M. Callender, E. G. Budd Mfg. Co.

2:00 P.M.—Research

Some Recent Developments in Stainless Steel Welding, by D. L. Mathias, Metal & Thermit Corp.
Bi-axial Fatigue Strength of Low-Carbon Steels, by George K. Morikawa and LeVan Griffis, Illinois Institute of Technology.
Intergranular Corrosion of Stainless Steel Welds, by Wm. T. Tiffin, University of Oklahoma.
Weldability Tests of Cast Steel, by C. E. Jackson and F. S. McKenna, Naval Research Lab.

2:00 P.M.—Ships

Controls Required for Safe and Economical Construction of Welded Ships, by D. G. Maxson, Welding Consultant, Marinship Corp.
Technical Control of Welding in Ship Construction, by M. H. MacKusick, California Shipbuilding Corp.
Evolution of Welding in Ship Building, by M. N. Maltseff, Western Pipe and Steel Co.
Multiple and Stack Machine Cutting, by A. H. Yoch, Air Reduction Sales Co.

8:00 P.M.—University Research Conference

Wednesday, October 18

9:30 A.M.—Aircraft

Aircraft Welding, by H. O. Klinke, Republic Aviation Corp.
Helium Shielded Arc Welding of Exhaust Collector Rings, by Francis H. Stevenson, Lockheed Aircraft Corp.
Multi-Arc Welding of Aluminum Alloys, by M. R. Rivenburgh and C. W. Steward, Curtiss-Wright Corp.
Arc Welding in Aircraft, by H. E. Shay, Douglas Aircraft Co., Inc.

9:30 A.M.—Research

Weldability—as-Rolled vs. Heat-Treated High Strength Constructional Steels, by Lt. S. A. Herres and W. L. Warner, Watertown Arsenal.
Stress Relief of Welded Joints, by Paul C. Cunnick, Lt. Col., Ordnance Dept., Rock Island Arsenal.
Development and Application of Modern Heavy Coated Arc Welding Electrodes, by D. C. Smith and W. G. Rinehart, Harnischfeger Corp.

2:00 P.M.—Aircraft

The Geometry of the Spot Welding Tip and Its Relation to Tip Life, by E. D. Crawford and C. W. Steward, Curtiss-Wright Corp.
Survey of Cleaning Practices for Spot Welding Aluminum Alloys, by F. M. Morris, Kaiser Cargo, Inc., Fleetwings Div.
An Evaluation of Process Control of Aircraft Welding, by P. H. Merriman, The Glenn L. Martin Co.
Gas Shielded Arc Welding, by F. A. Wassell, General Electric Co.

2:00 P.M.—Machinery

Production Problems and Production Control, by E. C. Brekelbaum, Harnischfeger Corp.
Routine Inspection and Salvage of Machinery Weldments—Rough, Partially Machined and Machined, by James W. Owens, Fairbanks, Morse & Co.
Welded Jigs and Fixtures, by A. N. Kugler, Air Reduction Sales Co.
Design of Welded Machinery, by John Mikulak, Electric Machinery Manufacturing Co.

2:00 P.M.—Piping and Pressure Vessels

Pressure Vessel Welding, by Edward B. McGuire, Hamler Boiler & Tank Co.
Effect of Normalizing on Welded Carbon-Molybdenum Pipe, by D. H. Corey, The Detroit Edison Co.
Properties of Welded Joints Between Dissimilar Metals, by E. C. Chapman and R. E. Lorentz, Combustion Engineering Co.
Oxy-Acetylene Pressure Welding, by A. R. Lytle, Union Carbide & Carbon Res. Labs.

6:30 P.M.—Section Officers Dinner and Conference

Thursday, Oct. 19

9:30 A.M.—Foundry

Oxy-Acetylene and Arc Welding Practices in Steel Foundries, by Frank Kiper and Lawrence Gabes, Ohio Steel Foundry.
Machine Cutting of Risers, Flame Scarfing to Remove Padding, and Flame Gouging to Remove Webs and Defects, by G. E. Bellew, Air Reduction Sales Co.
Repair of Castings, by L. A. Danse, Cadillac Motor Car Div., General Motors Corp.

9:30 A.M.—Miscellaneous

Joining at Low Temperatures, by W. D. Wasserman, Eutectic Welding Alloys Co.
Developments in Metallizing, by Wm. C. Reid, Metallizing Engineering Co.
How Much Ductility Is Necessary in a Structure?, by W. J. Conley, Lincoln Electric Co.

2:00 P.M.—Business Meeting

3:00 P.M.—Board of Directors Meeting

More Carbon Steels Being Used for Springs

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

The trend toward alloy steels for spring production has been reversed to a certain degree in recent years, said G. C. Wilcox, chief metallurgist and director of experimental laboratory, Wallace Barnes Co., Bristol, Conn., speaking on "The Metallurgy of Spring Manufacture" at the meeting of Ontario Chapter A. S. M. on May 5.

The majority of failures in springs result from the application of stresses beyond the limits of the springs, or from poor fatigue characteristics of the metal, he continued. Depth and ease of hardening and toughness are important properties. The principal advantage accruing from the use of alloy steels is in the realm of greater toughness. In spring steels it will be found that if a carbon steel and an alloy have the same structure and hardness, their properties are practically identical.

Photomicrographs illustrated acceptable and inacceptable structures in hot rolled spring steel. Badly banded steel is not accepted, since after cold rolling it will give a very non-uniform elastic limit in the stock, resulting in a poor endurance.

Another characteristic which has an important influence on the acceptability of spring stock is grain size. A grain size of No. 7 A.S.T.M. or finer, at 1450° F. is generally satisfactory. Yet another characteristic is that the steel should show no graphitic development after special treatment.

Two main methods used in the manufacture of springs are the hard and the soft process. In the soft process the steel is descaled and annealed in a protective atmosphere to secure the spheroidized structure which provides the least resistance to cold rolling. Subsequent anneals that may be required in the reduction process are carried out at a somewhat lower temperature—1300 to 1355° F.—since no further change in the steel is desired.

Such steel strip is hardened and tempered for clock springs and other uses. Other types of springs are annealed for better fabrication with lead bath treatment.

The hard process is used in the production of music wire and hard drawn spring wire. Rods are air-patented or lead-patented. After cleaning they are drawn and when they become too hard are again patented. The grain is elongated in the process and a tough, strong wire results with tensile strength of 250,000 to 450,000 psi.

A.S.M. Review of Current Metal Literature — *Continued*

18. HEAT TREATMENT (*cont.*)

18-142. **Interrupted Quench in Salt.** *Steel Processing*, v. 30, June '44, pp. 379-382.
Austempering, isothermal quenching, martempering.

18-143. **The Control of Composition and Heat-Treatment in 0.25 C, 1.5 Mn Steel Castings.** T. W. Ruffle. Institute of British Foundrymen Advance Copy 800, June 10, '44, 5 pp.
Normalizing heats outside composition limits, water quenching and tempering, quenching, tempering temperature, time of tempering, temper brittlenss, tropenas converter steel.

18-144. **Modification by Heat Treatment of Cast Structures and Properties.** H. T. Angus. Institute of British Foundrymen Advance Copy 802, June 10, '44, 10 pp.
Effect of solidification structures upon the heat treatment and properties of two cast commercial steels, a medium carbon, and a high carbon, high silicon steel. For medium C steel figures are given for mechanical properties obtainable with various heat treatments. For high C high Si steel, the properties and structures obtainable with normalizing and spheroidizing are given, and the production and distribution of temper carbon is discussed.

18-145. **Hand Hammers.** R. T. Rolfe and J. R. Bryant. *Iron & Steel*, v. 17, May '44, pp. 379-382.
Importance of correct heat treatment and some causes of failure. 5 ref.

18-146. **End-Quench Test Reveals Changes in Steel Induced by Heat.** Charles M. Parker. *American Machinist*, v. 88, July 6, '44, pp. 100-103.
Simple testing method bears out data obtained by more laborious tests. Quenching conditions and heating controlled closely.

18-147. **Induction Hardening of A. P. Shot.** Thomas E. Lloyd. *Iron Age*, v. 154, July 6, '44, pp. 58-60.
At Eaton Mfg. Co.'s heater plant a line for heat treating and finishing 37 and 40-mm. armor piercing shot has been in operation for many months. The Tocco induction heating process provides a fast, easily manipulated and controlled method for heat treating.

18-148. **Megacycle Induction Heat for Thin Cases.** V. W. Sherman. *Metals & Alloys*, v. 19, June '44, pp. 1409-1414.
Use of frequencies higher than 1,000,000 cycles (1 megacycle) per sec. for metal treatment. Such ultra-high frequencies may have value for the production of very thin "cases" using the mass of cold underlying metal as the quenching medium rather than externally applied water. Properties of such cases, the operating factors and typical applications of megacycle heating.

18-149. **84-Inch Torsion Bars.** A. H. Allen. *Steel*, v. 115, July 17, '44, p. 130, 186.
Heat treated after machining and grinding without resulting scale or decarburization.

18-150. **Continuous Induction Heat Treating.** *Iron Age*, v. 154, July 20, '44, p. 69.
Application of Megatherm high frequency energy to finished bearing pins, each 2½ in. long by ½ in. diameter, which are case hardened to a depth of 0.025 in. as they are fed automatically through a glass tube and water quenched as they leave the heating coil at rate of 75 bearing pins per min.

18-151. **Induction Hardening Advantageous in Fabrication of Gun Parts.** *American Machinist*, v. 88, July 20, '44, pp. 96-97.
Induction hardening eliminates flame and lead-pot hardening, is faster, and avoids the problem of removing lead from recesses. Soldering and brazing by the process have speeded assembly operations.

18-152. **Expediting Curtiss-Wright Heat-Treating, Anodizing and Plating.** E. K. Fry. *Machinery*, v. 50, July '44, pp. 192-198.
Mechanical aids which save time for skilled workers have helped Curtiss-Wright to meet its increased production schedules in the face of labor shortages.

18-153. **Scaling Properties.** A. Preece and R. V. Riley. *Iron & Steel*, v. 17, May 18, '44, pp. 459-462.
Behavior of steels in furnace atmospheres at 1150° C.

18-154. **Why Carburize?** D. McPherson. *Machinery* (London), v. 64, June 1, '44, pp. 605-607.
Purpose of case hardening; function of a case hardened surface; effect of non-homogeneity on micro-hardness and crystal properties. 5 ref.

18-155. **The Rate of Heating Steel.** W. Trinks. *Industrial Heating*, v. 11, July '44, pp. 1049-1056.
Mathematical development.

18-156. **Axelson Modernizes Heat Department.** *Western Metals*, v. 2, July '44, pp. 12-15.
New equipment enlarges scope of company's work.

18-157. **Application of S-Curve Data to Heat Treating Problems.** R. L. Cunningham and Arthur Dube. *Canadian Metals & Metallurgical Industries*, v. 7, July '44, pp. 22-26.
To develop a combination of high hardness and toughness in the steel, austempering can be applied. Martempering will definitely minimize the internal stresses developed on quenching, and an isothermal annealing treatment will result in a considerable saving of time and money. To make successful use of these treatments, the S-curve of a steel should be known. Factors which affect the position of the S-curve and change the hardenability are: Variations in grain size, composition, and in carbide solution. 23 ref.

18-158. **Surface Hardening of Metals.** H. C. Gillespie. *Electronics*, v. 17, July '44, pp. 102-105, 188, 192, 196.
Plain and alloy steels processed by induction at radio frequencies above 10 kc. exhibit superior wear and fatigue characteristics. Elimination of external quenching speeds heat treatment, permits close control of cooling rate and assures uniformity of product. Distortion, scale formation and decarburization are minimized.

18-159. **High-Carbon Steels.** James R. Blanchard, Robert M. Parke and Alvin J. Herzig. *Iron and Steel*, v. 17, June '44, pp. 519-522.
Effect of molybdenum on the isothermal sub-critical transformation of austenite.

18-160. **The Nitriding Process.** E. Simister. *Metallurgia*, v. 30, May '44, pp. 18-24.
The process briefly described, modern types of nitriding steels and their heat treatment discussed, and some of the main features of nitriding equipment are described.

18-161. **Some Recent Heat-Treatment Plant Installations.** *Metallurgia*, v. 30, May '44, pp. 24-32.
Urgent demand for heat treatment equipment has presented many problems. To meet the emergency, production engineers, metallurgists and heat treatment plant designers have cooperated, and although the marked increase in size of equipment necessary has been largely accomplished by improvisation and adaptation, much development is evident.

18-162. **Some Developments in the Hardening of Ferrous Alloys.** A. E. Shorter. *Metallurgia*, v. 30, May '44, pp. 33-37.
Flame hardening has advanced from an obscure metallurgical idea to an established practice. The technique developed has improved the facilities for producing the degree of hardness desired, within the possible range, on an automatic basis. Experimental work is discussed, showing some of these developments and how they are applied in practice.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-176. **Efficient Die Operations.** *Steel*, v. 115, July 3, '44, pp. 86-87, 104, 126, 128.
Permit 600-ton load in punching 29 holes to be handled on 225-ton press in landing mat production line. For blanking out aircraft engine mounting rings, 115 in. of lineal cut are made in ½-in. steel plate on 700-ton press, a job ordinarily requiring 1150 tons.

19-177. **The Production of the 0.50-In. Ammunition Link.** *Machinery* (London), v. 64, May 11, '44, pp. 505-512.
Automatically controlled operations on multi-operation presses.

19-178. **Bar and Tube Straightening.** Walter Siegerist. *Iron & Steel Engineer*, v. 21, June '44, pp. 35-44, 63.
Straightening requires the neutralization or balancing of all stresses in the bar. This necessitates bending in the reverse direction to a degree sufficient to exceed the elastic limit in the outer fibers. The methods and equipment for straightening are discussed.

19-179. **Developments in Steel Mill Bearings.** H. L. Smith. *Iron & Steel Engineer*, v. 21, June '44, pp. 64-65.
Lead-base babbitts containing arsenic have been substituted for tin-base alloys with satisfactory results. A method of repairing bearings in bronze, steel or cast iron shells.

19-180. **Shell Forging.** M. D. Stone. *Steel Processing*, v. 30, June '44, pp. 353-354, 382-383.
Metal flow and associated forces.

19-181. **Lubrication of Metal Forming Machinery.** *Steel Processing*, v. 30, June '44, pp. 368-369, 384.
Equipment is comprised of four centralized lubricating systems designed for application to small, medium, and large heavy duty machinery as well as to large batteries of machinery where it is desirable to lubricate hundreds of bearings from a central point.

19-182. **Aging and the Yield Point in Deep Drawing Steel Sheets.** J. R. Low and M. Gensamer. *Steel Processing*, v. 30, June '44, pp. 372-373.
Bibliography of 100 references.

19-183. **Anderson Aluminum Forge Plant.** Joseph Geschelin. *Automotive Industries*, v. 90, June 15, '44, pp. 22-25, 102.
Operated under supervision of the Chevrolet Mfg. plant in Muncie, Ind., first of the division's units to get into volume production of aluminum forgings with forging presses.

19-184. **Rolling Mills for Light Alloys.** *Engineers' Digest*, v. 1, June '44, pp. 404-406.
Formula used in fixing the sizes of rolls, housings, bearings, screws; determination of housings and roll diameters in cold rolling.

19-185. **Forging Shot From Alloy Bar Stock.** G. Eldridge Stedman. *Steel*, v. 115, July 3, '44, pp. 106-108, 110, 113.
Kansas City Plant—first in the United States to use cupola-melted scrap in the form of hot metal with cold charge in the open-hearth—swings on to production of armor-piercing shot steel early in 1942. Unique procedure for producing the forgings is employed.

19-186. **Post-War Reorganization.** Norman F. Dufty. *Iron & Steel*, v. 17, May '44, pp. 360-362.
Out-of-date mills, Talbot and arc furnaces, eliminate old plants, arc furnace as refiner, brakes on progress, success despite handicaps, a National Metallurgical Laboratory.

19-187. **Contoured - Cavity Shell Forging.** Metals & *Alloys*, v. 19, June '44, pp. 1402-1404.
Advantages of the contoured-cavity method over the straight cavity method.

19-188. **Riveting of Airplane Spars by Presswork at Ford Plant.** P. D. Aird. *Modern Industrial Press*, v. 6, June '44, pp. 20-22, 32.
Adaptation of the press to meet the new demand was comparatively simple. The plastic feeding mechanism was cut off and the press was fitted to operate as a simple hydraulic press, operating on a pressure cycle of 2½ sec.

19-189. **Designing of "Trouble-Free" Dies.** C. W. Hinman. *Modern Industrial Press*, v. 6, June '44, p. 30.
By using forethought and more care, several of the common types of expanding and bulging operations can be successfully performed without using either fluid or soft rubber, and the operations are speeded up materially.

19-190. **Reverse Drawing of Stainless Steel at Lockheed Aircraft Corporation.** Jack L. McGraw and W. Glenn Schwartz. *Modern Industrial Press*, v. 6, June '44, pp. 38, 40, 42.
One of the many unique and modern forming methods is that used in reverse drawing ball and sleeve assemblies for the exhaust collectors on a new model bomber for the Navy. A repeated reverse draw from a circular blank of stainless steel is successfully accomplished to produce a complete assembly in one piece.

19-191. **Economy in Blanking.** Sergius D. Brootzkoos. *Modern Industrial Press*, v. 6, June '44. pp. 48, 50.
Relation between the number of round blanks to be cut, the number of rows to be selected and the length of the stock needed. This will determine the most economical size of the stock to be used.

19-192. **What's Ahead in Metal Stamping.** *American Machinist*, v. 88, July 6, '44, pp. 91-98.
How some of the advances in stamping will affect production.

19-193. **Methods for Forming Sheet Aluminum. III.** *Aviation*, v. 43, July '44, pp. 166-167, 264, 267.
Blanking and piercing detailed.

19-194. **Coating Compounds — Their Capabilities and Functions.** John H. Richards. *Wire & Wire Products*, v. 19, July '44, pp. 415-418, 454.
Resume of some typical performances of coating compounds in wire mill practice today, and a discussion of their functions, on both ferrous and alloy wires.

19-195. **Electric Equipment for Wire Drawing Machines.** A. L. Thurman. *Wire & Wire Products*, v. 19, July '44, pp. 420-424, 454.
Single block machine, multiple-block machine with single motor drive, group driven blocks, continuous machines, semi-continuous machines, multi-block continuous machines with individual block drives.

19-196. **Bethlehem Develops Special Tool for Making Dead Ends.** *Wire & Wire Products*, v. 19, July '44, pp. 430-431.
Primary winding element with developed prongs which so engage the wire that continuous tension is induced as the wire is wound. Chromium plated contact surfaces minimize displacement of the zinc.

19-197. **Stepped Extrusions.** Kirby F. Thornton. *Mechanical Engineering*, v. 66, July '44, pp. 443-446.
Aircraft designs called for tapered spar caps; mechanical and other characteristics; accuracy of extrusion process; economics of multiple steps.

19-198. **Zinc Plating for Lubrication in Ironing and Drawing.** Harold A. Shepard. American Electroplaters' Society *Monthly Review*, v. 31, July '44, pp. 613-618.
Metal stock is formed and drawn into the semi-finished product. Final drawing operation is an ironing operation which irons the metal out to the desired wall thickness and length.

19-199. **Shapes Parts for Aircraft.** *Steel*, v. 115, July 10, '44, pp. 94, 128.
New speed and economy by Roto stretching method.

19-200. **Improved Presses for Aircraft Sheet Metal Forming.** Russell Powell. *Aero Digest*, v. 45, June 15, '44, pp. 86-87, 138.
Blankholder deep metal drawing press, hydraulic press equipped with rubber pad, "all-hydraulic" forging press.

19-201. **Plastic Punches Facilitate Lockheed Metal-Forming.** George H. Prudden. *Machinery*, 50, July '44, pp. 136-145.
Experience with punches made of thermoplastics and used in conjunction with Kirksite dies has proved that important advantages are attainable from this practice.

19-202. **Boeing Technique in Stretch - Forming Rolled and Extruded Shapes.** Boyd K. Bucey. *Machinery*, v. 50, July '44, pp. 146-155.
Principles followed in determining the proper path of cams and levers for controlling stretch-forming operations, and rules to observe in order to avoid distortion of sections.

19-203. **Rubber Sheeting Speeds Up Martin Stretching Operations.** Harry F. Vollmer. *Machinery*, v. 50, July '44, pp. 156-163.
How a simple idea saved production time on stretch-block work, eliminated hazards in handling stretched skin sections, promoted cleanliness, and reduced stretch-block costs. Stretching of extruded and rolled shapes.

19-204. **Hot-Forming Magnesium Plates at Northrop.** Paul Hawley and Robert L. Gunter. *Machinery*, v. 50, July '44, pp. 176-181.
Magnesium plates ¼ in. thick are successfully formed by a unique process which has decided advantages over more conventional methods.

19-205. **Consolidated Vultee Bucking-Bar Development Expedites Production Riveting.** E. P. Myers. *Machinery*, v. 50, July '44, pp. 188-191.
Savings in materials, reduced manpower requirements, increased output, and improved workmanship are some of the advantages derived from radically different rivet-bucking devices of portable and built-in types.

19-206. **Friction.** L. D. Colam. *Iron & Steel*, v. 17, May 18, '44, pp. 391-396.
Particular needs of the rolling mill—brasses, anti-friction alloys, lubricants and lubricating systems. Data are given showing the increasing use of centralised systems in American steel plants, and examples of actual savings cited.

19-207. **Canadian Shell Forging Plant Uses Alloy Cast Iron Punch Tips.** *Industrial Heating*, v. 11, July '44, pp. 1084-1086.
A one-operation non-extrusion process for forging shells with interior cavities completely finished, requiring no final machining. Advantages claimed: (1) Substantial savings in material, (2) more rapid production to closer tolerances, (3) lower tool costs, (4) labor savings, and (5) fewer rejections.

19-208. **Recent Developments in Stretch Forming of Aircraft Parts.** Harry Wilkin Perry. *Modern Industrial Press*, v. 6, July '44, pp. 22, 23, 46, 48.
The process is analogous to hydraulic pressing, drawing and hammering in that it expands the metal to convex contours, but it is simpler and faster than hammering and drawing, as it accomplishes the result usually in a single operation. It is a relatively cheap method because of the low cost of form blocks compared with the cost of conventional dies and because of the large saving in forming time.

19-209. **Designing of "Trouble-Free" Dies.** C. W. Hinman. *Modern Industrial Press*, v. 6, July '44, p. 28.
Saving time, costs and materials in building aircraft dies.

19-210. **Production Is Increased by Specially Designed Press Room Equipment.** Eugene E. James. *Modern Industrial Press*, v. 6, July '44, pp. 35. 36. 38. 40.
The floating pad, the adjustable block holder, the magnetic die set.

19-211. **A Set of Dies that Solved a Difficult Tooling Job.** Carl C. Taylor. *Modern Industrial Press*, v. 6, July '44, pp. 42, 44.
Problems encountered in producing irregular drawn parts of stainless steel.

Metal Literature Review—*Continued*

19. WORKING (*cont.*)

19-212. Heavy Presses at Chevrolet Produce Intricate Bomber Parts. P. D. Aird. *Modern Industrial Press*, v. 6, July '44, pp. 11, 12, 14.
Several factors go into the final result, not the least of which is development in die design and, in the particular plant where wheel housings are being turned out, a press layout that permits a steady and uninterrupted flow of parts through the various processing stages.

19-213. Expanded Oregon Steel Mill Produces Equipment for Maritime Commission. *Western Metals*, v. 2, July '44, p. 29.
Hesse-Ersted takes over rolling mill for increased production.

19-214. Modern Forging Practice. W. A. DeRidder. *Western Metals*, v. 2, July '44, pp. 7-11.
Forging equipment; inspection; furnaces; die design and production; strength of carbon steels at elevated temperatures; production and die life using SAE 1020 as 100; minimum corner radii and fillets for forgings; draft; correct and incorrect method of dimensioning radii and fillets; additional design data; recommended minimum dimensions for "I" beam sections.

19-215. Precision Thread Rolling with Flat and Cylindrical Dies. *Machinery* (London), v. 64, June 1, '44, pp. 589-598.
High production, increased tensile strength, and superior surface.

20. MACHINING AND MACHINE TOOLS

20-231. Some Grinding Methods Used in Aircraft Production. *Machinery* (London), v. 64, April 13, '44, pp. 406-409.
The ingenious arrangements shown have solved many of the problems in the manufacture of aircraft parts.

20-232. Carbide Milling of Steel. H. A. Frommelt. *Iron Age*, v. 153, June 22, '44, pp. 52-57.
Phenomenal gains in output and cutter life by the use of negative angle carbide milling cutters over high speed steel cutters. Test data in chart form demonstrating the relation of lead or bevel angle and the number of pieces obtained per grind, and the relationship between spindle horsepower and depth of cut, feed rate and width of cut. Cutter life tests are summarized.

20-233. Grinding High Speed Steel Tools. N. A. Malone. *Steel*, v. 115, July 10, '44, pp. 96, 98, 114.
Selection of the proper grade of grinding wheel as to type of abrasive and bond for a specific job is highly important. Care is required to prevent glazing the surface of the abrasive grains. Emphasis is laid on tool standardization as well as the staff manning the tool supply department.

20-234. Negative-Rake Milling. *Machinery* (London), v. 64, May 18, '44, pp. 533-543.
A revolutionary development in shop practice.

20-235. Are Your Machines Overloaded? Gerald Eldridge Stedman. *Tool Engineer*, v. 14, July '44, pp. 70-72.
Knoxville machinery manufacturer designs jigs to put shaper jobs on milling machine or boring mill. Other setups increase production from 50 to 400% on shapers, planers and radial drills.

20-236. Tooling to Increase Production Efficiency. *Tool Engineer*, v. 14, July '44, pp. 74-81.
Improved machining setups, forming for high production, two classes of assembly tooling.

20-237. Design and Use of British Magnetic Chucks. *Tool Engineer*, v. 14, July '44, pp. 82-84.
Magnetism and grip, features of various chucks, a special development, performance of other chucks, clamps not required.

20-238. Machining Magnesium. A. M. Lennie. *Tool Engineer*, v. 14, July '44, pp. 85-88.
Ease and economy of machining magnesium frequently make it the cheapest structural material. Quality finish and production savings may be achieved through utilization of recommended machining practice.

20-239. Rapid Indexing Fixture.. S. Smith. *Machinery* (London), v. 64, June 8, '44, p. 621.
Fixture illustrated, applied to a horizontal milling machine, was designed for rapidly milling the oil slots in transfer tubes.

20-240. Power Required in Milling with Negative-Rake Cutters. H. Ernst. *Machinery* (London), v. 64, June 8, '44, pp. 623-625.
Stronger tooth form obtained with the negative rake angle is a definite advantage and more than offset by a less effective cutting action. Power required to remove metal increases greatly as the conventional positive rake angle is decreased.

20-241. The Art of Counterboring. H. F. Williams. *Machine Tool Blue Book*, v. 40, July '44, pp. 133-134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156.
Suggestions are given which will indicate when to counterbore for a saving of time, effort and cost.

20-242. Carbide Milling of Steel. H. A. Frommelt. *Machine Tool Blue Book*, v. 40, July '44, pp. 161-162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188-190.
History, characteristics, typical illustrations.

20-243. Momentum in Carbide Milling of Steel. E. O. Lowell. *Machine Tool Blue Book*, v. 40, July '44, pp. 199-200, 202.
Increase in momentum can be obtained through an increase of either mass or motion. Large mass of gear train in relation to the size of the milling cutter produces the momentum necessary for longer cutter life.

20-244. Production Milling. *Machine Tool Blue Book*, v. 40, July '44, pp. 219-220, 222, 224.
The present trend is away from special equipment, composed of a standard machine to which has been added a specially designed or engineered fixture or attachment. The present trend indicates the acceptance and use of equipment specially engineered throughout.

20-245. Recommendations on the Use of Diamond Tools. Paul Grodzinski. *Machine Tool Blue Book*, v. 40, July '44, pp. 255-256, 258, 260, 262.
The diamond is set rigidly into a steel holder or shank. The special method is to have only one cutting edge in operation at a time. Thus geometrically correct surfaces are produced.

20-246. Cutting Tool Nomenclature. J. Rennie. *Machinery* (London), v. 64, June 15, '44, pp. 655-657.
Definitions, tool setting, types of tools.

20-247. Speeds and Feeds for Milling Operations. S. C. B. *Machinery* (London), v. 64, June 15, '44, pp. 660-663.
Method used to determine speeds and feeds, table feeds, feed and chip thickness, first step in determining speeds and feeds, power feeds and maximum chip thickness.

20-248. Determining Tool Forces in High-Speed Milling by Thermoanalysis. A. O. Schmidt. *Mechanical Engineering*, v. 66, July '44, pp. 439-442.
Relation between cutting speeds, feeds, tool angles, and workpiece material. Test procedures and sample computations of derived data are included.

20-249. High Production Machining of Magneto Parts. H. M. Fraser. *Die Casting*, v. 2, July '44, pp. 57-62.
To get the full advantages of die castings, designs should consider final machining factors. Comprehensive study of suggested tooling and set-ups for a variety of zinc, aluminum and brass parts.

20-250. Developments in Precision Tapping and Correct Tap Nomenclature. R. R. Williams. *Tool & Die Journal*, v. 10, July '44, pp. 96-97, 104.
Why to expect a tap to cut larger than its own pitch diameter.

20-251. Knowledge of a Tap's Action Extends Its Maximum Usefulness. Herman Goldberg. *American Machinist*, v. 88, July 6, '44, pp. 104-107.
Proper choice of taps, care in sharpening practice and use of correct cutting oils to avoid overloading will contribute to marked savings in tool costs.

20-252. Set-Ups for Increasing Production with Formed or Multiple Wheels. A. Lambert Oller. *American Machinist*, v. 88, July 6, '44, pp. 108-110.
It pays to study any plunge-cut grinding operation to see whether it can be done quicker with a formed wheel, or by mounting several wheels on the spindle. Very often seeming bottlenecks in production are easily solved by one of the setups illustrated.

20-253. Practical Ideas. *American Machinist*, v. 88, July 6, '44, pp. 111-116.
Magnetic frame supports drill motor. Turning a sphere on a milling machine. Spring tool cuts chambered hole. Chucking small pieces on a B. & S. grinder. Lathe stops arranged to turn shoulder. Laying out holes to close tolerances. Short nipples threaded in collet chuck. Fixture speeds sawing of masonite. Rough and semifinish facing in one operation. Jig locates angle iron for drilling.

20-254. Controlled Lubrication Program Curtails Failure in Machine Tools. Frank A. Sylvester. *American Machinist*, v. 88, July 6, '44, pp. 117-121.
Allis-Chalmers uses color code to assure servicing of machines with proper oils. Cards marked at individual machines after servicing provide daily records.

20-255. Tooling Dock Technique Saves Time, Speeds Accuracy. Leland A. Bryant. *Aviation*, v. 43, July '44, pp. 152-154, 263.
Convair finds automatic elimination of errors and increased tool production are direct results of adoption of this principle of assembly and checking of jigs and fixtures.

20-256. Hole Piercing Proves Faster—and Cheaper. I. Herbert Chase. *Aviation*, v. 43, July '44, pp. 161-163, 262.
Obviating use of drills, Martin system combines with conveyor belt line to simplify and boost production of small assemblies.

20-257. Toolbits of 30° Radial Rake Speed Machining of Magnesium. Paul Thut. *American Machinist*, v. 88, July 20, '44, pp. 91-95.
Thin-section Mg alloy die castings are machined at cutting speeds as high as 15,000 surface ft. per min. Two toolbits are used on the majority of cutters.

20-258. Lightweight, Simple Fixtures Pave Way for High-Speed Tapping. Herman Goldberg. *American Machinist*, v. 88, July 20, '44, pp. 98-101.
Since loading often takes more time than actual tapping, care must be taken to design fixtures for fast loading, as well as to hold and support pieces properly.

20-259. Bushings Threaded Four Times Faster With Carbide-Tipped Tools. C. O. Averill. *American Machinist*, v. 88 July 20, '44, pp. 102-104.
By means of interchangeable tool-blocks fitted with two preset tungsten carbide toolbits, production increased with respect to machining the external thread on aircraft spark plug bushings.

20-260. Special Indexing Device Hastens Milling of Multi-Surface Slots. I. F. Huey and W. L. Doney. *American Machinist* v. 88, July 20, '44, pp. 106-107.
Dovetail slots, formerly milled with special form cutters, are cut four at a time with plain milling cutters operating in gangs of eight and two set-ups.

20-261. Machine Lubrication May Follow Automotive Service Methods. F. L. Schafenacher. *American Machinist*, v. 88, July 20, '44, pp. 108-109.
Lubrication program to minimize machine breakdowns.

20-262. Practical Ideas. *American Machinist*, v. 88, July 20, '44, pp. 113-118.
Gage checks diameter of bellmouthed dies. Layout table simplifies cutting of Al sheet. Surface gage fitted with micrometer. Chain and sprocket drives for tumbling barrels. One die shoe for several sizes of dies. Emergency milling on a lathe. Boring bar holding arm. Machining cams on a drill press. Radius forming tool cuts concave and convex surfaces. Lathe attachment for pipe threading machine. Equalizing fixture for threading forked rods. Controlling accuracy of formed stampings.

20-263. Milling Douglas Integral-Eye Spar Caps From Rolled Billets. N. A. Lombard and G. R. Gwynne. *Machinery*, v. 50, July '44, pp. 164-175.
Manufacturing technique established for producing two spar caps of unique design from one aluminum billet 30 ft. in length.

(Continued on Page 13)

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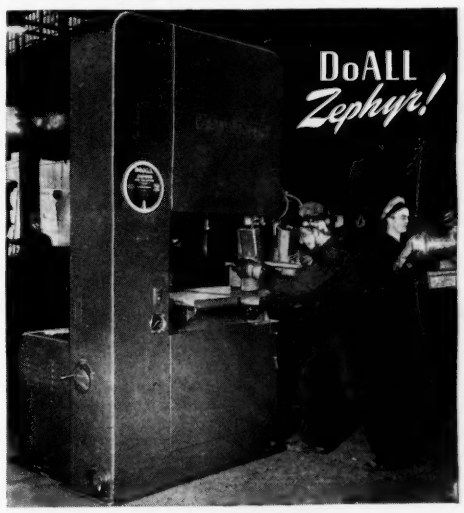

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Chairman—Robert D. Stout, Lehigh University, Bethlehem, Pa.; **Vice-Chairman**—T. G. Foulkes, Bethlehem Steel Co., Bethlehem; **Secretary-Treasurer**—R. L. Deily, Bethlehem Steel Co., Bethlehem.

Los Angeles Chapter

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Louisville Chapter

Chairman—L. W. Hennings, Jr., Tube Turns, Inc., 224 E. Broadway, Louisville, Ky.; **Vice-Chairman**—C. H. Peters, E. F. Houghton & Co., 541 E. Broadway, Louisville 2; **Secretary-Treasurer**—Raymond B. Smith, Reynolds Metals Co., Plants No. 7 and 8, Louisville.

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Elected for 1944-1945

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Pan American Metallurgy Furthered by New Institute

The first "Pan American Congress of Mining Engineering and Geology" was organized by the South American Union of Engineering Associations and held in Santiago, Chile, in January 1942. Engineers from the United States who attended were so impressed with the fruitful possibilities of such an organization that they recently resolved to organize a United States Section, and formal steps in that direction were taken at a meeting last April, wherein Dean Edward Steidle of the School of Mineral Industries, Pennsylvania State College, was elected chairman.

Dean Steidle said that the name of the Congress is rather ambiguous, since the sections on ferrous and non-ferrous metallurgy were two of the most active during the first meeting in Chile.

All A.S.M. members who believe that Pan American cooperation in science and technology as well as in economics and trade will be essential in postwar times are invited to communicate with Dean Steidle at State College, Pa. He will gladly send full information.

CALENDAR OF FUTURE MEETINGS

August 29-Sept. 1—American Institute of Electrical Engineers. Pacific Coast Technical Meeting, Los Angeles. (H. H. Henline, 29 West 39th St., New York 18, N. Y.)

Sept. 25-27—Association of Iron and Steel Engineers. Annual Engineering Conference, Pittsburgh. (Brent Wiley, Empire Bldg., Pittsburgh.)

Sept. 28-30—National Tool and Die Manufacturers Association. Annual Meeting, Hotel Statler, Buffalo, N. Y. (M. W. Rowell, General Manager, Southern Bldg., 15th and H Sts., Washington, D. C.)

Oct. 2-5—American Society of Mechanical Engineers. Fall Meeting, Netherland-Plaza Hotel, Cincinnati, Ohio. (Clarence E. Davies, Secretary, 29 West 39th St., New York 18, N. Y.)

Oct. 5-6—American Institute of Mining and Metallurgical Engineers. Electric Furnace Steel Conference, Pittsburgh, Pa. (F. T. Sisco, 29 West 39th St., New York 18, N. Y.)

Oct. 5-7—Society of Automotive Engineers. Aircraft Engineering and Production Meeting, Hotel Biltmore, Los Angeles, Calif. (John A. C. Warner, Secretary and General Manager, 29 West 39th St., New York 18, N. Y.)

Oct. 5-7—National Electronics Conference. Medinah Club, Chicago. (Beverly Dudley, Secretary, 520 N. Michigan Ave., Chicago, Ill.)

Oct. 6-9—Electronic Parts and Equipment Industry Conference. Edgewater Beach Hotel, Chicago (Herb Clough, Beldon Mfg. Co., Chicago.)

Oct. 10-11—Gray Iron Founders' Society. Fall Meeting, Cincinnati, Ohio. (W. W. Rose, Executive Vice-President, 1341 Connecticut Ave., N. W., Washington, D. C.)

Oct. 12-14—American Society of Tool Engineers. Semi-Annual Meeting, Syracuse, N. Y. (Adrian L. Potter, Executive Secretary, 2567 W. Grand Blvd., Detroit 8, Mich.)

Oct. 13-14—Electrochemical Society. Fall meeting, Hotel Statler, Buffalo, N. Y. (Colin G. Fink, Columbia University, New York City.)

Oct. 16-20—National Metal Congress and War Conference Display. Public Auditorium, Cleveland, Ohio. (W. H. Eisenman, 7301 Euclid Ave., Cleveland 3, Ohio.)

Oct. 16-20—American Society for Metals. 26th Annual Meeting, Hotel Statler and Hotel Hollenden, Cleveland, Ohio. (W. H. Eisenman, Secretary, 7301 Euclid Ave., Cleveland 3, Ohio.)

Oct. 16-18—American Institute of Mining and Metallurgical Engineers. Fall Meetings of Iron and Steel Division and Institute of Metals Division, Hotel Statler, Cleveland, Ohio. (F. T. Sisco, 29 West 39th St., New York 18, N. Y.)

Oct. 16-19—American Welding Society. Annual Meeting, Hotel Cleveland, Cleveland, Ohio. (Miss M. M. Kelly, Secretary, 33 West 39th Street, New York 18, N. Y.)

Oct. 16-19—Wire Association. Annual Meeting, Pittsburgh, Pa. (R. E. Brown, Secretary, 300 Main St., Stamford, Conn.)

Oct. 17-20—Society for Experimental Stress Analysis. Semi-Annual Meeting, Hotel Carter, Cleveland, Ohio. (Prof. W. M. Murray, Massachusetts Institute of Technology, Cambridge, Mass.)

Oct. 19-20—American Industrial Radium and X-Ray Society. Annual Meeting, Hotel Hollenden, Cleveland, Ohio. (Philip D. Johnson, Secretary, 25 East Washington St., Chicago 2, Ill.)

Metal Literature Review

20. MACHINING (cont.)

20-264. Grinding to Ten-Thousandths Inch on a High Production Basis. Ralph Price. *Machinery*, v. 50, July '44, pp. 201-204.

Methods and equipment used for high production grinding of work that is held to size within 0.0001 in.

20-265. How to Secure Fine Surfaces by Grinding. H. J. Wills and H. J. Ingram. *Machinery*, v. 50, July '44, pp. 208-209.

Lapping operations as applied to the production of gears and worms.

20-266. Cushioning of Tipped Turning Tools. Clarence E. Buote and Robert Holden. *Iron Age*, v. 154, July 20, '44, pp. 70-72.

Extensive tests conducted in machining 75-mm. A. P. shot indicate that "cushioned" carbide tools with a copper shim under the tip have almost doubled the life between grinds over standard tipped tools. Using a cushioned braze on tipped high speed steel dovetail form tools has eliminated breakage completely. In general it has been found that copper cushions ranging between 1/64 and 1/32 in. in thickness gave better results than greater or lesser cushions.

20-267. Hyper-Milling. *Automobile Engineer*, v. 34, June '44, pp. 223-229.

Results obtained in a number of production operations and details of feeds, speeds and cutters described. Recommendations given concerning machines, fixtures, and operating precautions.

20-268. Gear Shaving. *Automobile Engineer*, v. 34, June '44, pp. 233-236.

Discussion of American methods and typical machines

20-269. Applications of Negative-rake Milling. *Machinery* (London), v. 64, May 25, '44, pp. 561-564.

Typical negative-rake milling operations, emphasizing their value in increasing production.

20-270. Air-Operated Jigs and Fixtures. L. H. Leedham. *Machinery* (London), v. 64, June 1, '44, pp. 601-604.

Description of two highly successful designs; the drilling and reaming fixture; fixture for the milling operation.

20-271. High Speed Milling Operations Improved by Reducing Number of Cutting Teeth. Fred W. Lucht. *Western Metals*, v. 2, July '44, pp. 34, 36.

Maintaining sufficient feed per tooth is important in steel cutting—particularly in roughing—to provide both sufficient tooth loading and adequate load distribution back of the cutting edge.

21. CLEANING AND FINISHING

21-80. Anodic or Cathodic Electrocleaning of Steel. Walter R. Meyer. American Electroplaters' Society *Monthly Review*, v. 31, June '4, pp. 511-514.

Anodic cleaning is preferable in almost all cases except when there are chlorinated compounds present that might cause attack on the steel.

21-81. Abrasive-Liquid Blast Produces Hone Finish. A. H. Eppler. *Product Engineering*, v. 15, July '44, pp. 468.

Fine abrasive suspended in a water-chemical emulsion and discharged by a spray nozzle at high velocity produces a finish comparable to that produced by honing. The process, originally intended for cleaning surfaces, is being used in numerous other applications because it is time saving and efficient in finishing surfaces.

21-82. Barrel Finishing of Metal Parts. R. W. Mitchell. *Metals & Alloys*, v. 19, June '44, pp. 1396-1401.

Outlines the nature and fields of application of tumbling, rolling, barrel de-burring, and burnishing of metal finishing and discusses the practical aspects of several specific problems that can be solved by one or more of these methods.

(Continued on Page 14)

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ROBERT B. SOSMAN and JAMES B. AUSTIN have been appointed assistant directors of U. S. Steel Corp. Research Laboratory, Kearny, N. J., and ROBERT H. ABORN has been named supervisor of physical metallurgy. All three are long-time members of the Research Laboratory staff, and prolific contributors to the technical literature. Dr. Austin is the author of "Heat Flow in Metals" and Dr. Sosman of "The Pyrometry of Solids and Surfaces."

EDWARD J. P. FISHER has been appointed manager of sales for the Morrison Engineering Corp. of Cleveland. His previous connections include R. Wallace & Sons Mfg. Co., Carpenter Steel Co., Diamond Chain & Mfg. Co., Keystone Steel & Wire Co., and the Aetna-Standard Engineering Co. He is a past chairman of the Indianapolis and Peoria Chapters A.S.M.

Three Men Give Symposium On Steel Cartridge Case

Reported by F. N. Meyer

Technical Supervisor, Waterbury Branch, American Brass Co.

A symposium on the manufacture of steel cartridge cases featured the April meeting of the New Haven Chapter A.S.M. The three speakers on the symposium were Henry G. Keshian, metallurgist of the Chase Brass and Copper Co.; Henry E. Robinson, furnace engineer of the American Brass Co.; and Maurice Reswick, lubrication engineer of the Standard Oil Co. of New Jersey.

Mr. Keshian discussed the chemical and physical properties of the steel used in the cases and in the tools used for the manufacture of the cases. To illustrate the differences involved in drawing steel and brass cases, he listed 34 operations required for steel and 21 operations for brass cases. He also discussed the types of steel used for tools and their heat treatment.

Mr. Robinson confined his talk to the furnace equipment needed for the various heat treating and annealing processes involved. He emphasized that when planning for new furnace equipment the effect of heat treating or annealing on the operations immediately following should be considered.

Mr. Reswick described the lubrication problems that have been encountered and the lubricants that have been developed to meet them. He pointed out the importance of the surface condition of the metal in the proper utilization of the lubricant.

Everyone agreed that the success of the steel cartridge case program was one of the outstanding achievements of American industry, and that it was made possible by the cooperation between the Cartridge Case Committee, headed by Col. Harold R. Turner, and the manufacturers involved.

FOR SALE: One Olsen-Brinell Proving Ring, complete in leather case with calibration report. Box 8-1, The Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio.

Metal Literature Review—*Continued*

21. CLEANING & FINISHING (*cont.*)

21-83. **Increasing Efficiency in Metal Finishing.** Jeffrey R. Stewart. *Products Finishing*, v. 8, July '44, pp. 30-32, 34.
Result of a literature search at the Library of Congress in Washington, D. C. intended to provide information in condensed form.

21-84. **Magnesium.** G. C. Close. *Industrial Finishing*, v. 20, July '44, pp. 30, 34, 36, 38, 40, 42.
Cleaning, surface treating and protective coating.

21-85. **War Product-Painting Management.** Red Sparks. *Industrial Finishing*, v. 20, July '44, pp. 44, 46, 48, 50.
How a painting set-up gets out more work and does it faster on same floor space.

21-86. **Industrial Dryers and Drying Systems: IV.** A. W. Ferre. *Industrial Heating*, v. 11, July '44, pp. 1126, 1131, 1134, 1136, 1138, 1140-1141.
Principles involved and illustrated descriptions of typical dryer installations.

21-87. **Electrolytic Pickling.** N. L. Evans. *Iron and Steel*, v. 17, June, '44, pp. 501-505.
Cleaning and descaling steel in molten caustic soda.

21-88. **Finishing Processes Employing Abrasives.** *Metallurgia*, v. 30, May '44, pp. 13, 14.
Investigations on various metal finishing operations have been carried out in Germany in an effort to find a clear definition for such methods as lapping, honing and super-finishing, and thus to reduce misinterpretation. 4 ref.

22. WELDING, BRAZING AND FLAME CUTTING

22-279. **Arc Welding Low Alloy High Tensile Structural Steel.** J. G. Ball. *Welding*, v. 12, May '44, pp. 223-232.
Weldability and recommendations as to technique. 3 ref.

22-280. **Arc Welding Electrodes.** W. Andrews. *Welding*, v. 12, May '44, pp. 245-248.
Compositions, properties, and applications.

22-281. **Electrode Pressure.** E. Leede. *Welding*, v. 12, May '44, pp. 249.
Use of a gage for accurate determination.

22-282. **Intricate Machine Parts.** A. E. Bedell and T. G. Morrison. *Steel*, v. 114, June 26, '44, pp. 90-92, 94, 139.
Fabricated by joining simple geometric elements cut from sheets, plate, shapes or piping. Proper design and sequence of assembly important.

22-283. **Developments in Use of Brazing in Production of Stamped Products.** *Steel Processing*, v. 30, June '44, pp. 355-357, 383.
New developments in the use of low and high temperature brazing for the joining of two or more stampings of like or different metals and its value in postwar planning.

22-284. **All-Welded Barges Feature Fabricating Operations at Warren City Manufacturing Company.** *Steel Processing*, v. 30, June '44, pp. 366-367, 385.
Production of LCM-3 barges; parts preparation division; welding division; X-ray department; shot blast and sand blast departments; heat treating division; machining division; assembly division; highlights.

22-285. **Recent Progress in the Application of Welding to Steel.** Wendell F. Hess. *Steel Processing*, v. 30, June '44, pp. 370-371, 392.
Factors affecting the successful application of welding. 5 ref.

22-286. **Hard-Surfacing by Welding.** C. R. Whittemore. *Canadian Metals and Metallurgical Industries*, v. 7, June '44, pp. 42-46, 61.
Types of wear; processes for applying hard-surfacing materials; the oxy-acetylene flame; oxy-acetylene process; electric arc welding; classes of hard-facing materials; properties of class III hard-facing materials—cobalt-chromium-tungsten, factors controlling welding rod quality.

22-287. **Ferrous Electric Welding—Fact and Fable.** D. Bruce Johnston. *Iron & Steel Engineer*, v. 21, June '44, pp. 45-56, 63.
Historical development, electric arc welding, bare wire, covered wire, rod coatings, D-C versus A-C, automatic arc welding, atomic hydrogen, flash welding.

22-288. **Welding Aluminum and Its Alloys.** *Oxy-Acetylene Tips*, v. 23, July '44, pp. 69-74.
Fundamental principles for welding aluminum sheet, plate, and castings.

22-289. **Safety in the Welding and Cutting Industry.** *Oxy-Acetylene Tips*, v. 23, July '44, pp. 77-78.
A review of the acetylene industry's program for preventing welding and cutting fires and accidents.

22-290. **How to Adjust the Welding Flame.** *Oxy-Acetylene Tips*, v. 23, July '44, pp. 80-83.
Fundamental principles and correct adjustment of the oxy-acetylene flame.

22-291. **Elimination of Waste.** *Oxy-Acetylene Tips*, v. 23, July '44, p. 84.
Practical ideas for saving oxygen and acetylene.

22-292. **Cast Iron Oil Blending Kettle Enlarged by Bronze-Welding.** *Oxy-Acetylene Tips*, v. 23, July '44, p. 87.
This successful application demonstrates how a complicated job can be made simple by bronze-welding.

22-293. **Erie Welds Otisville Tunnel Rails in Track by Thermit Full-Fusion Process.** *Railway Engineering and Maintenance*, v. 40, July '44, pp. 608-611, 614.
Using a new-type weld and doing the work in place, this road has connected the rails in the eastbound track in its mile-long Otisville tunnel into continuous lengths. Characteristics of the weld and the manner it was installed in the tunnel described.

22-294. **Flame Cutting of Steel.** P. Grassmann and R. Bechtle. *Z. Ver. deut Ing.*, v. 87, 1943, pp. 603-604; *Engineers' Digest*, v. 1, June '44, pp. 408-409.
Flame cutting is characterized in that the oxygen jet of the torch oxidizes the iron and then blows the molten oxide out of the cut thus made.

22-295. **A New Method for Welding Cables.** H. Gunther. *ETZ* v. 63, 1942, pp. 587-91; *Engineers' Digest*, v. 1, June '44, pp. 410-412.
Special feature of this method is that it consists of a butt welding process in an enclosed space, and that it can be regulated automatically. This makes possible the use of heavy welding currents which in turn results in short welding times.

22-296. **Welding Meets War's Demands for High-Speed Production of Machine Equipment.** William J. Conley. *Modern Industrial Press*, v. 6, June '44, p. 28.
The development of arc welding as a modern tool for mass production demonstrated by the unprecedented output of ships, planes, tanks, guns and other major military items produced today. But behind the vast development of war industry, lies a remarkable example of manufacturing skill and ingenuity in turning out the machine tools necessary to make this fighting equipment.

22-297. **Arc Welding Electrodes.** W. Andrews. *Welding*, v. 12, June '44, pp. 266-270.
Compositions, properties, and applications. 15 ref.

22-298. **"Storage Battery" Welding.** *Welding*, v. 12, June '44, pp. 271-272.
Employing storage batteries to provide welding current developed in the U. S. New equipment is specially suited for work on Al parts in aircraft assembly. This system is claimed to possess several important advantages.

22-299. **The Replacement of Castings.** J. K. Johannesen. *Welding*, v. 12, June '44, pp. 273-276.
Superiority of welded fabrications.

22-300. **Gas Welding of Aluminum.** P. L. Pocock. *Welding*, v. 12, June '44, pp. 282-287.
Technique.

22-301. **Tests on Mild Steel Electrodes.** D. M. Kerr. *Welding*, v. 12, June '44, pp. 282-287.
Results of a series of tests carried out on varying types and sizes of mild steel electrodes to determine weight of weld metal deposit and melt-off rates.

22-302. **The Spot Welding of Light Alloys.** R. F. Tylecote. *Welding*, v. 12, June '44, pp. 298-305.
Machines and methods, surface preparation, electrodes.

22-303. **Weldability of Steel.** *Metal Progress*, v. 46, July '44, pp. 67-73.
Deviations in Predicted Weldability by Lehigh and Rensselaer Systems, by Daniel Rosenthal; Hot Cracks Versus Cold Cracks—to Distinguish them in Welded Joints, by Gerard H. Boss; Weldability—a More Complete Definition by Oss. I. Temper.

22-304. **Special Shapes for Welding Designs.** W. J. Conley. *Steel*, v. 115, July 10, '44, pp. 88-89, 130.
Production of steel shapes such as sheets and plates, bars, structurals, piping and tubing in forms more readily adaptable for fabrication into assemblies by welding are advocated. Typical range of sizes suggested.

22-305. **The Joining of Metal.** J. Aherne-Heron and L. N. Smith. *Iron Age*, v. 154, July 13, '44, pp. 59-60.
Various methods of joining light alloys compared with each other. Possibilities for developing new forms of joining which would well repay investigation.

22-306. **D. & S. L. Renews Tunnel Rail.** *Railway Age*, v. 117, July 15, '44, pp. 108-111, 123-124.
Develops new full-fusion Thermit welds, use of a special rail section to offset corrosion and radiographs to check soundness of all welds.

22-307. **Metallurgy of Wiped Solder Joints.** G. S. Phipps. *Bell Laboratories Record*, v. 22, July '44, pp. 472-476.
By wiping off all of the solder in excess of a fillet, many causes of porosity can be eliminated. 60% less solder is required by the new joint, and splicers find it easier to make. New method depends on the characteristic behavior of lead-tin alloys in the process of freezing.

22-308. **A Discussion of Some of the Factors that Affect Welding in Shipbuilding.** R. O. Waldman. *Wire & Wire Products*, v. 19, July 44, pp. 426-427.
Welding electrodes and coatings; type of steel used; stresses and strains set up by welding.

22-309. **Electrical Bonding in Airplanes.** W. H. Arata. *Aero Digest*, v. 45, June 15, '44, p. 120.
Good electrical bond has a resistance approximately equal to that which would obtain if the two parts were integral. Purposes served by bonding are: Reduction of lighting hazards, prevention of shock to personnel when the plane lands and avoidance of sparking near gas tanks. Lockheed Aircraft Corp. standards and specifications by which bonding is regulated described.

22-310. **Atomic Hydrogen Arc Welding.** W. J. Van den Akker. *Steel*, v. 115, July 17, '44, pp. 114, 116, 166.
Aids joining of thin sheet in aircraft production.

22-311. **Repairing Cracked Cylinder Blocks by Electric Bonding.** L. E. Kunkler. *Steel*, v. 115, July 17, '44, pp. 125, 182, 184.
Combination of specially designed spot welding transformer, pure Ni electrodes deposited with vibrating motion, and colloidal solution effective in repair work. Method eliminates high temperatures which set up stresses, and avoids recrystallization.

22-312. **Welding for Postwar Construction—Discussion.** Van Rensselaer P. Saxe. *Iron Age*, v. 154, July 20. '44, pp. 73, 146.
Ship structures compared, owner influence.

22-313. **Applying HSS and Cast Alloy Welding Rod to Tool Manufacture and Salvage.** Albert W. Ehlers. *Tool & Die Journal*, v. 10, July '44, pp. 91-95.
Tool salvage and repair, an emergency repair, welded construction of form tools.

22-314. **Automatic Welding of NAX 9115 Sheet.** A. H. Scheffer. *Industry & Welding*, v. 17, July '44, pp. 33-35.
A light gage metal is required for oxygen breathing tanks used in combat aircraft. NAX 9115 steel (0.40 and 0.50 gage) replaced critical alloys and atomic hydrogen welding was used. Burst pressure tests run up to 100 psi.

22-315. **Silver Brazing 4.2 Mortar Shells.** *Industry & Welding*, v. 17, July '44, pp. 36-37, 40.
Brazing nose adapters to 4.2 chemical mortar shells by means of high frequency induction.

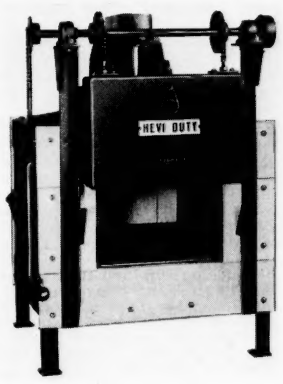
(Continued on Page 16)

NEW PRODUCTS IN REVIEW

CONVECTION TEMPERING FURNACE

Hevi Duty Electric Co., Milwaukee, Wis.

This Type MU-12148-A convection tempering furnace is designed particularly for the tempering of small work for production or the tool room, and for many low temperature applications in the laboratory. It serves as a companion furnace to the Type MU-55 furnace which is used for the hardening of carbon and alloy steels and to Type G-8125 furnace used for the hardening of high speed steel.



The motor driven fan located in the roof of the heating chamber provides a rapid and even distribution of heat, assuring a uniform temperature through the entire charge. Accurate control of temperature at any point within the heat range of this furnace is accomplished by means of any standard controlling pyrometer.

Mention R400 When Writing or Using Reader Service.

NEW FINISH AND PAINT BASE PROTECTS WAR EQUIPMENT

Rheem Research Products, Inc., Baltimore, Md.

An anti-corrosive treatment known as Iridite that vastly increases the field of usefulness of zinc and cadmium coating has been developed here and is now protecting much U. S. military equipment. Iridite is used both as a final finish and as a paint base.

With camouflage requirements in mind, Iridite has been developed in two natural colors—Army olive drab and a lusterless jet black. As a paint base it prevents zinc from "poisoning" the paint, and prevents the formation of any soapy, chalky under-layer that destroys all adhesion.

Iridite is applied by simple dipping. Times range from 10 to 60 sec., and temperatures from 75° to 100° F. A brief rinse in hot water eliminates drying problems and completes the process. Parts may be handled or shipped as soon as they are dry.

The protective solution does not alter dimensions or the texture of final finishes by more than 0.00003 in. Extreme flexibility is claimed; parts treated can be bent or twisted without chipping, flaking or in any way affecting their corrosion resistant qualities.

Mention R401 When Writing or Using Reader Service.

IMPROVED RESISTANCE WELDS WITH ELECTRONIC CONTROL

General Electric Co., Schenectady, N. Y.

A new voltage regulator for use with most G-E resistance welding controls that include the phase-shift method of heat control, is announced by this company. This device is designed to regulate the welding current automatically, so that it is held constant regardless of line-voltage variations of as much as +10 or —20%. Hence the quality of the weld is greatly improved and continuous readjustment of the heat setting is unnecessary.

Known as the CR7503-D157, the regulator consists of a resistor circuit connected to the power line which supplies the welding machine, and an electronic circuit. When the regulator is in use, this eletronic circuit functions not only to hold the average voltage of the resistor current constant, but also changes, electronically, the phase control voltages of the main welding control panel. Thus if the line voltage drops, which normally would cause the current through the welding transformer and the voltage of the resistor circuit to vary correspondingly, the regulator advances the phase control voltages, there automatically holding the welding current constant within close limits. A four-page leaflet presents a more comprehensive description and is available from G-E direct or through use of the Reader Service Coupon on page x.

Mention R402 When Writing or Using Reader Service.

CONTROL PANEL FOR TACK WELDING

Air Reduction, 60 E. 42nd St., New York 17, N. Y.

A new and improved circuit control panel for tack welding with a constant potential power supply is to be known as the Wilson Type 30 special tack welding circuit control panel. The resistors of round nichrome wire are mounted on insulators and are designed well within the permitted temperature rise. The housing has sheet metal sides with expanded metal top and bottom to provide for full circulation of air.

Current values are controlled by specially designed contacts and are adjusted by turning fiber handles tight against a copper bus bar to connect the various resistors into the circuit, output current being the sum of the resistors so connected. Panels are available in 150-amp. and 230-amp. sizes. Complete technical data are available in a new bulletin.

Mention R403 When Writing or Using Reader Service.

MASKING STICKERS

Avery Adhesives, 451 East 3rd St., Los Angeles 13, Calif.

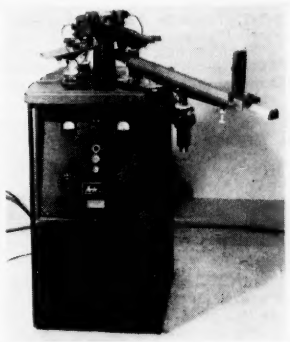
A method of making masking stickers cut to the size and shape specified by the manufacturers has been developed by this company, marketers of industrial adhesive stickers under the Kum-Kleen name. These stickers are easy to handle because they are applied without moistening and peel off without scraping or tearing. These precut masking stickers eliminate the necessity of masks being cut by the operator by hand and experience has shown that they have increased speed of masking operations, particularly in covering smaller areas.

Mention R404 When Writing or Using Reader Service.

X-RAY DIFFRACTION UNIT USES LOW-ANGLE-SCATTER CAMERA

North American Philips Co.,
100 E. 42nd St., New York 17, N. Y.

Readily solving analysis problems which formerly were considered impossible in the metallurgical field, a new X-ray diffraction unit has been perfected by this company that can be used with its newly developed low-angle-scatter camera or with other standard types of cameras.



While X-ray diffraction is not new in itself, the utilization of new accessories and techniques now available will prove invaluable in such fields as welding, casting, forging, armaments, aircraft and many others.

The new diffraction unit has a four-windowed tube enclosed in a massive bronze housing. Diffraction patterns of four different specimens can be obtained simultaneously. A number of types of X-ray tubes can be provided, included in which are targets of tungsten, molybdenum, cobalt, iron, chromium and copper. Tubes can be changed quickly, usually in 2 minutes, using only a screwdriver. Fully shockproof and rayproof, the unit utilizes full wave rectification which permits higher output and longer life from the tube. Filament current supply is stabilized, control of kilovoltage and milliamperage is smooth and stepless, tube is protected automatically if water supply fails, equipment has start-stop pushbutton control, and provision is made for use of automatic exposure timer.

Mention R405 When Writing or Using Reader Service.

LIGHTER, SMALLER ELECTRODE HOLDER

Martin Wells, 5886 Compton Ave., Los Angeles 1, Calif.

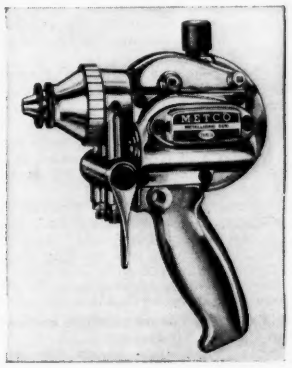
Stubby, a new, lighter, shorter, smaller diameter electrode holder, of 300-ampere capacity, has been added to the line of "Suregrip" holders. Principal features are its adaptability to close quarter work, its high electrical conductivity, 60° angle grip on the rod, and the fact that it enables the welder to burn rods right down to the last inch. The model 3RS pictured weighs long, and the diameter of the handle is only 1¼ in.

Mention R406 When Writing or Using Reader Service.

NEW GUN SPRAYS ZINC, TIN, LEAD, COPPER

Metallizing Engineering Co., Inc.
38-14 30th St., Long Island City 1, N. Y.

The Type 3E metallizing gun is specially engineered for the high speed production spraying of low melting point metals. Using ⅛-in. zinc, tin, lead, solder, babbitt, cadmium, or fine gage copper and copper alloys, this new gun is said to exhibit spraying speeds which exceed any yet attained with these metals. Rates of deposition, in pounds per hour, include: Zinc, 40; tin, 70; lead, 110; solder, 90; babbitt, 75.



Regardless of the type of wire employed, no gear changes are necessary to achieve these high speeds. Any spraying speed within the prescribed ranges is automatically obtained and maintained by the patented controlled power unit—an integral part of the gun. Air pressure fluctuations do not affect its operating efficiency.

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A.S.M. Review of Current Metal Literature—*Continued*

22. WELDING (*Cont.*)

22-316. **Causes of Variation in Welding Current.** Joseph S. Wright. *Industry & Welding*, v. 17. July '44, pp. 41-42.
How to get the right heat for the job and keep it from fluctuating.

22-317. **The Control of Quality Workmanship III.** Robert Burnett. *Industry & Welding*, v. 17, July '44, pp. 44, 46, 80.
Proper training of welders, defects, undercutting, speed of welding.

22-318. **Design for Welding.** F. W. Sykes. *Industry & Welding*, v. 17, July '44, pp. 62-64, 66-73.
Fundamentals.

22-319. **Fabrication and Welding of Exhaust Manifolds.** C. D. LaFond and J. R. Plautz. *Welding Journal*, v. 23, June '44, pp. 501-504.
Manufacture and welding of manifold and a review of the problem from the designer's viewpoint.

22-320. **The Measurement and Prevention of Eye Flash.** Philip Drinker. *Welding Journal*, v. 23, June '44, pp. 505-506.
Standards for protective glass; distance and exposure for 'arc flash" injury; measuring dosage by light meter; workers must be properly protected. 4 ref.

22-321. **Repair and Maintenance of Tools.** T. B. Jefferson. *Welding Journal*, v. 23, June '44, pp. 506-511.
Maintenance of tools and equipment by the use of welding, cutting, metal spraying and related welding processes.

22-322. **Welding of Railroad Transport Equipment.** Charles O. Druetzler. *Welding Journal*, v. 23, June '44, pp. 512-516.
Construction and procedures used in arc welding the General Motors diesel electric freight locomotives.

22-323. **How to Select Electrodes for High-Quality Vertical and Overhead Work.** H. O. Westendarp. *Welding Journal*, v. 23, June '44, pp. 516-517.
A. W. S. classes E6010 and E6011 vs. E6012 and E6013.

22-324. **Practical Ways to Improve Machine Cutting.** H. H. Moss. *Welding Journal*, v. 23, June '44, pp. 518-524.
Nozzle selection, flame adjustment, starting the cut, per cent of lag, characteristics of kerf, bevel cuts.

22-325. **Coast Guard Inspection of Welding in Shipbuilding.** R. D. Schmidtman. *Welding Journal*, v. 23, June '44, pp. 525-528.
Historical sketch of welded shipbuilding in Coast Guard; Coast Guard welding standards; training and experience of inspectors. Approval of plans, review and approval of the welding sequence, qualification of the welding process or processes, qualification of welding operators, inspection of production welding, post-welding tests.

22-326. **The Theory and Use of Specifications to Expedite and Control Production.** O. R. Sutherland. *Welding Journal*, v. 23, June '44, pp. 529-532.
Things essential to the proper preparation and use of specifications.

22-327. **"Arc Flash" Conjunctivitis.** Forrest E. Rieke. *Welding Journal*, v. 23, June '44, pp. 533-536.
New problems for employees and physicians, eye complaints rank high, nature of the injury, statistics on arc flash eye injuries, a typical case, confusion from records, treatment, shipyard program. 2 ref.

22-328. **Weldable Steel Castings.** Welton J. Crook. *Welding Journal*, v. 23, June '44, pp. 257-S-271-s.
Weldability bead test; relation between Brinell hardness and tensile strength; characteristics of steel castings produced by various foundries; physical properties; weldability tests; macrostructure of weld beads; depth of penetration and depth of heat-affected zone; the physical properties of metal in the heat-affected zone, welded cast steel specimen material; physical properties; method of test; bead applications; location of tensile specimens.

22-329. **Selective Copper Brazing in Salt Baths.** *Industrial Heating*, v. 11, July '44, pp. 1099-1100.
Electric salt bath furnaces which not only permit the selective heating of the parts to be brazed, but also eliminate decarburization, and have reduced scrap from 15% to a maximum of 3%.

22-330. **Factors Affecting the Strength of Soldered Joints Made From Electrotinned Steel Sheet.** A. W. Hothersall, D. W. Hopkins, and G. L. Evans. Iron & Steel Institute, Advance Copy, Feb. '44, 18 pp.
Effect of the method of cleaning steel sheet in preparation for electro-tinning on the strength of soldered joints, using a tearing test; effect on the joint strength of the weight of tin coating, the time of storing the plated sheet before soldering and the type of solder.

22-331. **The Facts About Welding.** *Modern Industry*, v. 8, July 15, '44, pp. 46-50, 52, 54, 56, 58, 60.
Does it stand up? What causes troubles? Can it cut costs? Clarifying answers to such questions package some practical ideas.

22-332. **Hard-Surfacing by Welding. II.** C. R. Whittemore. *Canadian Metals & Metallurgical Industries*, v. 7, July '44, pp. 39-42.
Materials which can be hard-faced; hard-facing steel and its alloys; design and preparation of machine parts; applications of class 3 hard facing materials. 21 ref.

22-333. **Spot Welding SO and ST Materials.** Jack L. McGraw. *Modern Industrial Press*, v. 6, July '44, pp. 24, 26.
This method of pressure welding by spot welding SO and ST materials together, when hole coordination or circumstances demand it, has been proven, put into practice, and not a part has been lost due to lack of hole coordination or faulty spot welding.

22-334. **Automatic Welding for "Victory" Ships.** M. H. MacKusick. *Western Metals*, v. 2, July '44, pp. 24-25.
Automatic welding at Calship is done by the well known "Union-Melt" process, using bare electrode wire in coils fed by an automatic machine.

22-335. **Welded Ships Without Distortion.** M. Q. Cellers. *Welaing Engineer*, v. 29, July '44, pp. 35-39.
What causes those perplexing and troublesome locked-up stresses? Can they be avoided? How?

22-336. **A Modern Welding Department.**. Thomas R. Hough. *Welding Engineer*, v. 29, July '44, pp. 40-43.
A clean, light and well ventilated working area, but it paid big dividends.

22-337. **Shadows of the Future.** T. B. Jefferson. *Welding Engineer*, v. 29, July '44, pp. 44-47.
Will plastics displace steel and non-ferrous materials in the postwar era? What will be the effects on industry? On welding? Who will use welding after the war?

22-338. **Arc Welding Cast Iron.** Charles Carter. *Welding Engineer*, v. 29, July '44, pp. 48-49.
No single type of electrode is "best" for cast iron welding. Different types of electrodes and procedures are required for different jobs. Helpful hints on when to use what.

22-339. **Saving Dollars for Foundries.** George Bellew. *Welding Engineer*, v. 29, July '44, p. 50.
Machine flame-cutting greatly reduces grinding in the removal of risers from castings. So smooth are many cuts that no grinding at all is necessary. No gouges to be filled in.

22-340. **Welded Drums on the Spot.** Fred B. Barton. *Welding Engineer*, v. 29, July '44, p. 51.
On-the-spot welding is something new.

22-341. **Underwater Cutting of Metal.** M. F. Rodman. *Welding Journal*, v. 23, July '44, pp. 603-609.
Difficulties, basic principles and applicability of the process.

22-342. **Metallic Arc-Welding Electrodes.** Harold Lawrence. *Welding Journal*, v. 23, July '44, pp. 610-621.
Fundamental information necessary to demonstrate how electrodes may be classified. Engineering service further influences electrode choice. Class E6010, E6011 and E6012 electrodes discussed.

22-343. **Sectional Ship Erection Welding Sequence.** Alfred E. Wallen. *Welding Journal*, v. 23, July '44, pp. 622-623.
Care should be taken to see that all major internal welding in each section be completed prior to their being welded together as a part of the ship.

22-344. **Hints on Silver Brazing.** H. H. Griffith. *Welding Journal*, v. 23, July '44, pp. 624-626.
Physical properties; flux is essential; use proper heat; corrosion resistance.

22-345. **Three-dimensional Lofting as an Aid in Jig Construction.** John W. Clerket. *Welding Journal*, v. 23, July '44, pp. 626-629.
Standardization of jig and fixture parts, and the development of three-dimensional lofting form, made it possible to attain economical manufacture of this complicated steel truss.

22-346. **Unique Jig Speeds Welding of Canteens.** W. F. Lautner. *Welding Journal*, v. 23, July '44, pp. 630, 631.
The average weld is completed in one minute twelve seconds.

22-347. **Mechanical Characteristics of Resistance Welds in Plain Carbon Steels.** *Welding Journal*, v. 23, July '44, pp. 309s-343s. 88 ref.
Summarizes the information available on the major variables affecting the mechanical properties of welds made in plain carbon steels by the resistance welding method.

22-348. **A Paper on Multi-Arc Welding of Aluminum Alloys.** Malcolm R. Rivenburgh and C. Weston Steward. *Welding Journal*, v. 23, July '44, pp. 344s-350s.
The essential elements of the process are: A twin carbon torch, a heavily coated metallic electrode, a metallic electrode holder, the part to be welded and two sources of current.

23. INDUSTRIAL USES AND APPLICATIONS

23-194. **Mass Production Techniques Are Applied to Intricate Assemblies.** William H. Hilmer. *Steel*, v. 114, June 26, '44, pp. 103-104, 106, 108.
Martin reduces number of man-hours required for assembling 26-ton patrol bombers by 61.5% in 18 months by use of universal riveting.

23-195. **Automotive Gears.** *Lubrication*, v. 30, June '44, pp. 57-64.
The cash value, types of gears, transmission design, the final drive and differential, how the gears are made, lubricating the automotive gear, maintenance and lubrication, how the laboratory evaluates a gear lubricant.

23-196. **Steel, Yesterday, Today and Tomorrow.** R. E. Zimmerman. *Metal Progress*, v. 46, July '44, pp. 75-78.
A conservative appraisal of the future uses of steel products as affected by the research and technical developments of the recent war years.

23-197. **Index of Uses for National Emergency Steels.** *Metal Progress*, v. 46, July '44, pp. 91-96.
Classification by NE numbers. Alphabetical list by uses. Chemical specifications and hardenabilities of NE steels.

23-198. **Producing Jackets and Primers for 0.30 Cartridges.** *Machinery* (London), v. 64, April 13, '44, pp. 393-401.
Manufacture of the bullet jackets and the primers; the assembly of the bullets and of the complete cartridges; and the automatic weighing and inspection of the finished cartridges.

23-199. **Fabricating Steel Invasion Mats.** *Steel Processing* v. 30, June '44, pp. 349-352.
Crimping; transverse units; painting and baking; side shields; wire staples used for reinforcing; buffer shields.

23-200. **The Z-Type Crankshaft.** F. E. Swain. *Automobile Engineer*, v. 34, May '44, pp. 206-207.
Cylinder disposition reviewed from a new angle.

23-201. **Gas Turbines.** *Iron & Steel*, v. 17, May '44, pp. 365-366.
The properties of steels and some other alloys suitable for temperatures up to about 550° C., and for temperatures of from 600° C. to well over 1000° C. Resistance to high temperatures, stresses and erosion are the primary requirements of the alloys used.

23-202. **Gage Control Cuts Production Costs.** Wallace A. Scotten. *Tool Engineer*, v. 14, July '44, pp. 67-69.
Motion economy applied to handling of gages, salvaging of rejects, and maintenance of inspection tools saves thousands of manhours.

23-203. **Metal Life Rafts: Tooling and Production.** Glenn Schwander. *Tool Engineer*, v. 14, July '44, pp. 89-92.
Specially designed jigs and fixtures cut assembly time on an unusual stamped metal product.

23-204. **Plastic Tooling Value Proved by Aircraft Production.** Harry W. Tompkins. *Tool & Die Journal*, v. 10, July '44, pp. 123-126, 128.
Value, uses, and cost history of plastic tools.

23-205. **Pratt & Whitney Aero-Engines and Turbo-Superchargers.** *Machinery* (London), v. 64, June 8, '44, pp. 617-620.
Ford production methods.

23-206. **Improvements in Metal Stitching Extend Its Use to Load-Bearing Structures.** G. W. Birdsall. *Steel*. 115, July 10, '44, pp. 84-87, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150.
Stitching wire and stitching machines now available no longer limit this comparatively new method by making metal-to-metal joints to use only in non-stressed applications. Extension of the process to semi-stressed and lightly loaded structures is a reality. Further important expansion in joining primary structures is predicted because of uniformly high physical properties now obtainable and because of excellent performance shown in service.

23-207. **Production of B.S.A.-Namco Ground-Thread Circular Chasers.** *Machinery* (London), v. 64, June 15, '44, pp. 645-649.
Operation schedules and necessary equipment.

23-208. **Good Mixers.** H. E. Metz. *Die Casting*, v. 2, July '44, pp. 20-22, 66-67.
Use of die castings to produce a more efficient, economical and esthetic product.

23-209. **Development of Special Steels for Naval Use.** E. G. Touceda. *Blast Furnace & Steel Plant*, v. 32, July '44, pp. 807-810.
Acceptability of steel for specific application; statistical analysis of test data as applied to the development of steel specifications.

23-210. **Railroad Structural Materials.** S. L. Hoyt and H. W. Gillett. *Railway Age*, v. 117, July 8, '44, pp. 83-86, 89.
Metallurgical aspects of the present status and future improvements in locomotives and cars.

23-211. **Electrical Steel for Transformers.** C. C. Horstman. *Westinghouse Engineer*, v. 4, July '44, pp. 120-123.
Electrical steel application to high-frequency transformers demands thinner gage core laminations to reduce eddy current losses. Permeability decreases and hysteresis loss increases with reduction in gage. Hipersil, in paper-thin ribbons for radio transformers, has these properties. 2 ref.

23-212. **Weber-Built All-Metal Life Rafts Compartmented Like Battleship.** *Modern Industrial Press*, v. 6, June '44, pp. 24, 26, 42.
Made of 16 gage cold rolled steel, each raft is separated into 19 airtight compartments, plus two airtight water tanks. Food and equipment are stored in four compartments near the center, and are reached through large openings in the side of the well deck. The openings are bolted closed by means of screws, which may be removed in a couple of minutes.

23-213. **A.G.M.A. Tentative Standard System Fine-Pitch Straight Bevel Gears.** *Product Engineering*, v. 15, July '44, pp. 473-476.
This tentative standard was adopted by the American Gear Manufacturers Association at their annual meeting, May 22-24, 1944.

23-214. **Modern Rolling Stock Materials.** Stephen H. Badgett. *Railway Age*, v. 117, July 15, '44, pp. 112-117, 124.
Passenger-car construction that has resulted in the development of the modern de luxe coach and the materials available for the future.

23-215. **Metallurgy of Spring Manufacture.** *Canadian Metals & Metallurgical Industries*, v. 7, July '44, p. 43.
Materials used; failures result from application of stresses beyond the limit of the springs; proper design; two methods of manufacture.

23-216. **Light Alloys in Metal Rectifiers.** *Light Metals*, v. 7, June '44, pp. 276-284, 285-296, 297, 298.
Selenium rectifier and the use made of light metals in its construction.

23-217. **Aluminum and Magnesium in the Electrical Industries.** *Light Metals*, v. 7, June '44, pp. 300-304, 306-308.
Analyzes the respective uses of steel-cored aluminum, and aluminum-base alloys for transmission lines.

23-218. **Helical Spring Calculations.** I. A. J. *Machinery*, (London), v. 64, May 25, '44, pp. 567-573.
Tables and worked examples.

23-219. **The Machine Tools Outlook.** Tell Berna. *Aero Digest*, v. 46, July 1, '44, pp. 58-59, 134, 136.
Top production in machine tools was reached in 1942. Demand fell off slightly in 1943, and total output for 1944 is expected to be less than half of that for 1942.

23-220. **Applications of High Temperature Conveyor Belts: I.** S. Craig Alexander. *Industrial Heating*, v. 11, July '44, pp. 1074, 1076, 1078, 1080, 1082.
Materials used in the construction of conveyor belts, types of belt construction, the factors which influence the selection of a particular design of belt or a belt-metal of a certain composition to meet specific service conditions, and the numerous ways in which conveyor systems can be installed to meet individual requirements.

23-221. **Flying Conestogas.** *Welding Engineer*, v. 29, July '44, p. 52
Welding stainless steel replaces riveted Al alloy sheets on new Navy cargo plane built by Budd Mfg. Co.

23-222. **Metal Patterns.** W. C. Perry. *Iron and Steel*, v. 17, June '44, pp. 488-490.
Their production for fighting vehicles.

23-223. **Caesium and its Application to Photo-Electric Cells.** A. G. Arend. *Metallurgia*, v. 30, May '44, pp. 7-9.
Extraction process outlined and attention is directed to the use of the metal in photo-electric cells.

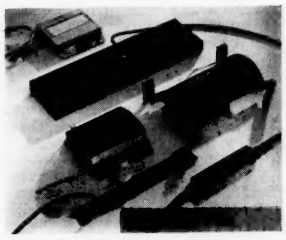
(Continued on Page 18)

NEW PRODUCTS IN REVIEW

CONTROLLED ELECTRIC CONTACT HEAT

H & A Manufacturing Co.,
86-100 Leroy Ave., Buffalo 14, N. Y.

Until now a military secret, an important advance in electric contact heating is announced by this company. Tens of thousands of units are said to have been produced during the past year and a half to serve a wide range of uses, principal among them being the heating of the bolt or firing mechanism on machine guns; the hydraulic actuating mechanisms on airplanes in the stratosphere and of storage batteries in army tanks in below-zero theaters of war.



The new heaters attain a degree of efficiency never before reached, it is claimed, and will be adapted to a multitude of peacetime uses since they can be made in nearly any size, contour and capacity. They have the advantages of light weight, of operating at low wattage, of being safe in the presence of explosive vapors, of operating without deterioration of the heating element, of withstanding severe vibration, and of maintaining exact temperatures within close limits.

Despite the low current consumption, which ranges from 35 watts to 400 watts in the various sizes and shapes of units so far developed, thermal losses are so well controlled and heat transfer so accomplished that a unit weighing only a few ounces will raise the temperature of 30-odd lb. of steel 90° above sub-zero external temperatures. The face of the heating plate is held in compressive, resilient contact against the surface through which the heat is to be transferred. No nuts or bolts or permanent attachments ordinarily are required; the units in most cases can be "sprung" onto the object. While they can readily be removed, if desired, their grip withstands the severest vibration. An attractive 16-page leaflet presents and illustrates other details.

Mention R408 When Writing or Using Reader Service.

ETHYL CELLULOSE PLASTIC STRIP COMPOUND

Aeroil Burner Co., Inc., West New York, N. J.

A new electrically heated Plast-O-Dip tank has been designed for the heating, melting and dipping of ethyl cellulose compounds. This unit features completely uniform, indirect heating through the medium of an agitated hot oil bath that completely surrounds the material, and also places heat in the ethyl cellulose by a new and novel method. As a result, the manufacturer claims that completely uniform, indirect heat is distributed underneath, above, around and within the ethyl cellulose itself, without any possibility of localized overheating, hot spots or degradation of the melt.

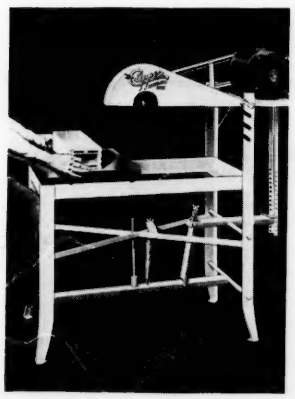
Both tank and removable cover are insulated. Tests have shown an overnight heat loss in the compound of only 10° F. per hr. with all heat shut off. Tank has a dipping space 25 in. long, 13 in. wide and 12 in. deep. Complete description, specifications, X-ray diagram, and action photographs are contained in a profusely illustrated bulletin, No. 280.

Mention R409 When Writing or Using Reader Service.

CLIPPER MASONRY SAW

Clipper Mfg. Co., 4027 Chouteau, St. Louis 10, Mo.

Quicker, more accurate, more efficient and economical cutting of refractories and masonry materials is claimed for this masonry saw. Designed for cutting special sizes and shapes of firebrick, this equipment will prove to be of value wherever furnaces, acid chambers or kilns require linings or repair work. The "multiple cutting principle", a special feature of this saw, utilizes a series of rapid, shallow cuts which discharge cuttings and reduce frictional heat. Smooth cuts, accurate to within a fraction of an inch, are made on clay, chrome, magnesite, silica and acid resistant brick.



Seven different models are available, each of sturdy steel frame construction with electrically driven motors. Gasoline model, also, for use in outlying districts where electricity is now available. All models are portable. Illustrated leaflets give complete details.

Mention R410 When Writing or Using Reader Service.

TWO RUST PREVENTIVES

Technical Processes Div., Colonial Alloys Co.,
Philadelphia, Pa.

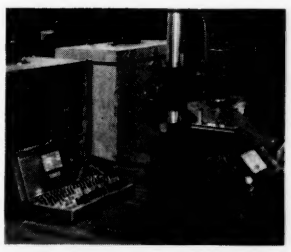
Two types of rust preventives have been released by this company. Actually, these two products are metal cleaning solvents, which leave protective films that prevent rust and tarnish. They are identified by the names Cyclodiene and Percyclodiene. Both are used as short time simple immersions at room temperature and are used in an open tank made of metal, glazed ceramic or other material. Neither will attack metals, as they are neutral and contain no acids, alkalies or water. Cyclodiene films dry in about 20 min., leaving rust inhibited, clean surfaces for a short time thereafter. Percyclodiene films will remain for about 30 days. A quick dip into either one of these rust inhibitive solvents prior to or between inspection and final finishing operations will protect the work from rust and corrosion. Small free samples are available to industrials.

Mention R411 When Writing or Using Reader Service.

COMPARATOR HAS FOUR RANGES OF MAGNIFICATION

Continental Machines, Inc.,
1301 Washington Ave. S., Minneapolis 4, Minn.

In a complete line of DoAll comparators, the basic feature is said to be a wide range of magnification, which enables one comparator to do the work which formerly required as many as four standard comparators. To accomplish this, each comparator has four magnification ranges, enabling work to be checked over a wide range of tolerances. For example, a work piece may be checked with a DoAll comparator to determine size variations of one millionth inch and on the same comparator a work piece can be checked for variations as great as 0.004 in.



Many other features are included in the design of this instrument. The spindle is equipped with variable pressure adjustment to provide the exact pressure required for measuring thick or thin sections, as well as for hard and soft materials. Spindle pressure is readily adjusted by a calibrated dial located at the top of the unit.

Three models of the comparators are offered, each having four ranges of magnification. Model 10, having a magnification range of 100,000, 50,000 10,000 and 5000, will measure variations of from one millionth to 400 millionths in. Model 20, having magnifications of 10,000, 5000, 1000, and 500, will measure variations from ten millionths to 0.004 in. Model 30, having magnifications of 2000, 1000, 200 and 100, will measure variations from 50 millionths to 0.002.

Mention R412 When Writing or Using Reader Service.

NEW ELECTRODE SPECIALLY MADE FOR OPERATION ON A.C.

Lincoln Electric Co., Cleveland, Ohio.

A new general purpose electrode for mild steel, designated as Fleetweld 35, and made specifically for operation on a.c. is available in 1/8-in., 5/32-in. and 7/32-in. sizes. This electrode, which will also operate on d.c. with either polarity, depending upon the type of work being done, has desirable characteristics for high speed welding of single or multiple passes for work in flat, vertical or overhead positions.

Mention R413 When Writing or Using Reader Service.

TWO NEW OUTDOOR A.C. WELDERS

General Electric Co., Schenectady, N. Y.

Two new outdoor alternating current welders, a 500-amp. type and a 300-amp. type, have been announced by the electric welding division of this company. The 500-amp. has a current range from 100 to 625 amp., while the range of the 300-amp. is from 60 to 375. Both welders are specifically designed for use in shipyards and similar outdoor locations where exposure to the weather is common.

These welders are equipped with an "idlematic" control which functions to reduce the output voltage automatically to less than 30 volts whenever the arc is not in operation, yet provides full power for welding, directly the arc is struck. In addition, this control is provided with a switch, conveniently operated by a handle projecting through the top of the case, for shutting off the welder when not in use.

Mention R414 When Writing or Using Reader Service.

MOGUL NERVOUS WELD PISTOL AND MACHINE

Metallizing Co. of America,
1330 Congress St., Chicago, Ill.

This new Mogul Nervous Weld process was developed primarily to solve the problem of reclaiming defective aluminum castings and can be used with equal success in salvaging bronze, gray iron, malleable and steel castings. Other important uses are the building up of surfaces for press fits, the repair of cracked housings, motor blocks, pump housings, as well as the preparation of surfaces for metallizing.

A complete installation to do this type of repair includes a Mogul Nervous Weld Pistol which requires approximately 60 lb. air pressure at 4 to 5 cu. ft. per min. and a Mogul Nervous Weld Machine, 110, 220, 440 volts, 60 cycle or 25 cycle, single phase. The latter unit is completely equipped with two 10-ft. lengths of cable, male and female receptacle, pair of goggles, heavy duty group clamp, 20 ft. long air hose complete with fittings, wall receptacle and complete instructions.

The Mogul Nervous Weld Pistol deposits atomized particles of metal which are welded to the surface and pressed leaving a metal which is welded and forged. Designed for manual operation, the rod (aluminum, bronze or nickel) is fed through the pistol by a trigger control and it is possible to feed 1/8 to 3/8 in. with one stroke of the finger-grip trigger.

One of the advantages of the pistol is that it eliminates stresses and distortion in the repair of defective aluminum castings. The temperature never rises above 125° and yet provides a deposit so dense at the point of fusion that there is no apparent line of demarcation. Even photomicrographs fail to show the line of demarcation. Aluminum castings, repaired with this unit, machine perfectly and withstand sodium hydroxide solutions used to prepare castings for alumilite plating. A bulletin gives complete details.

Mention R415 When Writing or Using Reader Service.

ABRASIVE STRIP SIMPLIFIES POLISHING OPERATIONS

Minnesota Mining and Manufacturing Co., St. Paul, Minn.

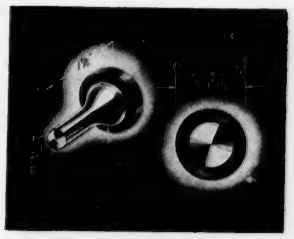
A new development that goes the regular spiral wound abrasive strip one better is the Elek-Tro-Cut Three-M-ite cloth reinforced spiral wound strip offered by this company. Reinforced so that it can be bent (as illustrated), it can then be inserted through a center and threaded through an oil hole or opening that presents a finishing problem. It is available in a wide range of grits, 1/16 to 1/4 in. dia, and 4 to 12 in. long.

Mention R416 When Writing or Using Reader Service.

FLUSH RIVET SET

Emerson Engineering Co.,
1418 S. Flower St., Los Angeles 15, Calif.

Operators now can safely and speedily drive rivets with one hand while installing the next rivet with the other hand, using this new flush rivet set. This is said to permit double operation without danger of flush set slipping or skidding off the rivet being driven. The flush rivet set includes a protective rubber ring slightly higher than the driving surface which acts as a guard and eliminates the possibility of marring the riveted surface. This set can be used with equal speed and safety by either experienced or inexperienced operators. Its use is said to increase driving speed of flush rivets considerably more than by any other means. The rivet set face is very slightly crowned and highly polished. The set is available with various face and shank diameters.



Mention R417 When Writing or Using Reader Service.

Employment Bureau

Positions Wanted

(Continued from page 6)

METALLURGIST: Graduate; experienced in open-hearth and rolling mill practice, metallurgical control of ferrous and non-ferrous ordnance production, heat treatment of aircraft alloys, and trouble shooting. At present supervisor of metallurgical control in large aircraft industry. Desires position in aggressive firm in Cleveland vicinity. Box 8-70.

METALLURGICAL ENGINEER: 16 years' experience in plant and research; desires connection with consulting organization or as chief metallurgist in progressive metal producing company. Broad experience in organizing research groups in modern metallurgical plants; 11 years with one of largest steel companies and director of research for past three years. Box 8-90.

YOUNG EXECUTIVE: 15 years' selling experience; practical engineering background. Interested in position as district manager or general sales manager of company producing alloy steels in sheet or strip. Excellent contacts. Location eastern seaboard. Box 8-95.

CHEMIST-METALLURGIST: Widely experienced in materials and processes. Desires customer contact position with growing concern with post-war possibilities. Available now. Box 8-100.

METALLURGICAL ENGINEER: Ph.D., experience in plant operation, research and teaching. Desires association with a university teaching metallurgy and carrying out industrial research problems. Box 8-105.

METALLURGIST-CHEMIST: Experienced in control of heat treating of alloy steels, charge of metal lographic, metallurgical, chemical laboratory; some experience in non-ferrous research, dies, precision casting, fundamentals of various steels; reads several European languages. Initiative and responsibility. Above draft age; small family. New York City or West Coast preferred. Box 8-110.

Metal Literature Review—*Continued*

24. DESIGN

24-31. **How End-Coil Design Affects Tension Springs.** A. M. Wahl. *Machine Design*, v. 16, July '44, pp. 107-112.
Stresses in end coils as well as initial tension and working stress. Design in tension springs. 10 ref.

24-32. **Thrust Bearing Design by Sleeve Bearing Analogy.** H. W. Hamm. *Product Engineering*, v. 15, July '44, pp. 437-440.
Determination of allowable bearing pressure, the coefficient of friction and the slipper angle for inclined slipper bearings by a method based on the hydrodynamic theory for sleeve bearings. Conversely, application of slipper bearing design principles to sleeve bearings indicates that allowable sleeve bearing pressures are high for slow-speed shafts.

24-33. **Spring-Supported Mountings for Vibration Isolation.** Merhyle F. Spotts. *Product Engineering*, v. 15, July '44, pp. 441-443.
How the general equation for forced vibration without damping can be expressed in convenient forms for use in reducing the forces and motions of vibrating machinery. Curves included for the graphical solution of the equation for any desired percentage of isolation.

24-34. **Tool Engineers Refine Set-Ups for M-53 Fuze Components.** *American Machinist*, v. 88, July 20, '44, pp. 119-128.
Tooling layouts for body, head, housing delay, slider plug, safety pin, and locking pin.

24-35. **Practical Points in Machine Design.** A Shop Foreman. *Machinery* (London), v. 64, June 1, '44, pp. 598-599.
The prime consideration in design should be simplicity. Data for taper calculations.

25. MISCELLANEOUS

25-155. **Safe Practices in Working Magnesium.** Arthur C. Stern and Charles B. Ford. *Iron Age*, v. 153, June 22, '44, pp. 64-70.
Approved safe practice recommendations for the prevention and control of fire and explosion hazards in magnesium alloy fabrication plants. Occupational health hazards are also pointed out. 12 ref.

25-156. **Steel Reclassification—A Vital Postwar Problem.** A. L. Hartley. *Steel*, v. 114, June 26, '44, pp. 86-87, 136.
Outline of a general procedure for the establishment of a steel standardization program.

25-157. **Locking System for Threaded Inserts and Studs.** *Steel*, v. 114, June 26, '44 p. 128.
A ring with serrations inside and out has been developed to lock the stud in place after installation.

25-158. **The Use of Gas in Processing the Materials of Tomorrow.** Lawrence E. Biemiller. *Steel Processing*, v. 30, June '44, pp. 375-378.
Various types of industrial gas equipment which have been recently developed, and new techniques which are being used in the production of industrial materials.

25-159. **Endless-Chain Monorail System, 2 Miles Long.** Robert Wells. *Steel*, v. 115, July 3, '44, pp. 96, 98, 101, 102.
Monthly production quotas for Helldivers are met regularly at Curtiss-Wright Corp.'s Columbus plant with aid of eight different kinds of conveyors.

25-160. **A List of Preferred Steels.** A. L. Hartley. *Steel*, v. 115, July 3, '44, pp. 88-89, 136, 138, 142, 144, 146.
A simplified and restricted list of preferred steels is long overdue and it can be successfully established. Such a program will result in the savings of millions of dollars annually to both producer and consumer. At the same time, it will enable machinery builders to produce better products.

25-161. **Alien Patents Available to Industry.** *Steel*, v. 115, July 10, '44, pp. 101-102, 104.
List of enemy patents of interest to the metalworking industries.

25-162. **Three Dimensional Drawings Speeded by Photographic Method.** *Iron Age*, v. 154, July 13, '44, pp. 61-62.
Three dimensional renditions from orthographic projections are used by those doing assembly work. Martin Axonograph produces a print in any one of the three trimetric planes—plan, face, or side—to fit the needs of any particular job.

25-163. **Bits and Pieces.** *Metal Progress*, v. 46, July '44, pp. 105-108.
Emergency Tempering Equipment, by Philip F. Atwood. Soft Soldering on Zinc Plated Parts, by H. L. Campbell. Rotate During Electro-Polishing, by Albert Guy. Armored Nibs on Core Boxes, by S. H. Horn. Preventing Scale From Affecting Hardenability Tests, by R. G. Townsend. Mixing Electrolytic Polishing Solution, by Jack H. Goodyear. Testing Continuity of Chromium Flash, by C. H. Aneshansley. Macroscopic Etch for Weld Specimens, by Philip R. Sperry. Computing A" or Ms (Transformation Temperature on Quenching) From Analysis, by Louis A. Carapella.

25-164. **Alien Patents Available to Industry.** *Steel*, v. 115, July 17, '44, pp. 119-120, 122, 172, 174, 176, 178.
A list of enemy patents on metallurgy.

25-165. **Shrink Fits.** C. S. Lucas. *Steel*, v. 115, July 17, '44, pp. 110-112, 160, 162.
Facilitated through use of induction heating coils to heat bores into which parts are to be fitted. Heating cycle shortened.

25-166. **The Martin Axonograph.** W. G. Wilkinson and H. C. Bartholomew. *Tool & Die Journal*, v. 10, July '44, pp. 110-113.
Description of process.

25-167. **Material Handling.** R. W. Mallick. *Mechanical Engineering*, v. 66, July '44, pp. 447-450.
Field for industrial progress. Equipments which have been developed or installations made for improved material-handling conditions.

25-168. **Master Tooling Dock.** C. W. Greaves. *Steel*, v. 115, July 24, '44, pp. 97-100.
Permits fabrication of fixtures on volume production basis.

25-169. **Gas Turbines and Turbosuperchargers.** Sanford A. Moss. American Society of Mechanical Engineers *Transactions*, v. 66, July '44, pp. 351-371.
Developments relating to the gas turbine and particularly to the perfection of the airplane engine turbosupercharger. United States and foreign gas turbine research projects and details of advancements in such items as nozzles, compressors, and the like discussed. 48 ref.

26. STATISTICS

26-68. **We Are Not Have-Nots in Copper, Lead and Zinc.** Evan Just. *Engineering & Mining Journal*, v. 145, June '44, pp. 69-72.
Data are presented to demonstrate that statements which characterize the United States as having reached a have-not status in minerals greatly underrate our true position in regard to copper, lead, and zinc. Charts showing the relationship between prices and production for the past 15 years illustrate the profound effect of prices on production and give a rough idea of our future capacities at various prices.

26-69. **South Dakota Manganese a Reserve for the Future.** E. T. Casler and I. M. Le Baron. *Engineering & Mining Journal*, v. 145, June '44, pp. 73-77.
Results of the research project at Chamberlain, S. D. to find a way of mining, recovering, and storing manganese nodules.

26-70. **War Production Board Reports on Lead Production, Consumption and Stocks.** *Mining Journal*, v. 28, June 30, '44, pp. 4-7.
Effects of the war on lead production, consumption, and stocks. Estimates also are made as to the probable effects of the new Selective Service rulings on mine labor, and a total loss of about 82,000 tons of lead production in the 12-month period ending April, 1945 is predicted.

H O T E L R E S E R V A T I O N F O R M

National Metal Congress and War Conference Displays

October 16 through 20, 1944

Cleveland, Ohio

PLEASE use this form in making your hotel reservations for this year's National Metal Congress in Cleveland. Because of its successful operation in the past four years, a Housing Bureau has been set up again this year to handle these reservation forms. All reservations should be sent to the Housing Bureau.

While the Housing Bureau will not assign rooms until the period between Sept. 1 and 15, it will be helpful to have your reservation as soon as possible in view of the crowded hotel conditions. If you write a letter regarding your hotel rooms, be sure to attach this form, since each of the cooperating societies has an application form of a different color. All applications will have immediate post card acknowledgment from the Housing Bureau.

Kindly indicate your date of arrival (time of day if possible), date of departure, and **notify the committee if you change your plans.** Try to double up where possible to make complete use of the rooms that are available. Hotels and room rates are:

HOTELS	Single Rooms	Double Rooms Double Bed	Double Rooms Twin Bed
AUDITORIUM	$2.00 to $3.50	$4.00 to $6.00	$4.50 to $7.00
CARTER	3.00 to 6.00	4.50 to 7.00	5.50 to 9.00
CLEVELAND	3.00 to 7.00	4.50 to 9.00	6.00 to 12.00
HOLLENDEN	3.00 to 5.00	4.50 to 6.50	5.00 to 12.00
OLMSTED	2.00 to 3.50	3.50 to 6.00	6.00 to 7.00
STATLER	3.00 to 6.00	5.00 to 8.00	5.00 to 8.00

Society headquarters are as follows:
American Society for Metals—Hotel Statler and Hotel Hollenden.
American Institute of Mining and Metallurgical Engineers—Hotel Statler.
American Welding Society—Hotel Cleveland.
American Industrial Radium and X-Ray Society—Hotel Hollenden.
Society for Experimental Stress Analysis—Hotel Carter.

H O T E L R E S E R V A T I O N A P P L I C A T I O N

National Metal Congress and War Conference Displays

October 16 through 20, 1944

Cleveland, Ohio

Mr. Edward C. Brennan, Chairman
Housing Bureau, National Metal Congress
Room 1604, Terminal Tower
Cleveland 13, Ohio

Date.....1944

Please make hotel reservations as noted below:

.....Single room(s) for one person.....Room rate desired $..... to $.....

.....Double room(s) with double bed.....Room rate desired $..... to $.....

.....Double room(s) with twin beds.....Room rate desired $..... to $.....

.....Parlor with ..... connecting bedrooms.....Room rate desired $..... to $.....

Arriving October.....A.M. or.....P.M. Leaving October.....

Hotel of First Choice.....

Hotel of Second Choice.....

Hotel of Third Choice.....

Applicant .....

Business Connection .....

Mail Address .....

City .....State .....

If your first-choice hotel is unable to accept your reservation, the Housing Bureau will endeavor to comply with your second or third choices in the order named. This application will have immediate postcard acknowledgment and you will be notified of your room assignment shortly after September 10.

(List of occupants other than myself, with their addresses, is attached)

Metal Literature Review

26-71. **Lead—Past, Present and Future.** Clinton H. Crane. *Metals*, v. 14, June '44, pp. 6-9.

Consumption of lead, lead output of domestic mines, recovery of lead from secondary sources.

26-72. **Role of Heavy Metals in Post-War Economy.** John D. Sullivan. *Mines Magazine*, v. 34 May '44, pp. 207-212, 218.

Iron and steel, steel alloying constituents, copper, zinc, lead, tin.

26-73. **What Are Strategic and Critical Materials?** Elmer W. Pehrson. *Mining and Metallurgy*, v. 25, July '44, pp. 339-341.

A brief review of the history of these terms, and of their present meaning, with some official definitions, as given by a leading member of the Bureau of Mines staff, will assist in an understanding of the current discussion of postwar stock-piling and surplus-disposal problems.

26-74. **The Spanish Metallurgical Industries. III.** *Chemical Age*, v. 50, June 3, '44, pp. 527-528.

Non-ferrous metals. Copper, lead, mercury, gold and silver.

26-75. **The Future of the Aluminum Industry.** W. C. Devereux. *Metallurgia*, v. 30, May '44, pp. 11, 12.

Emphasizes the need for an early statement, by a responsible authority, on the possible postwar reductions in the price of aluminum alloys, and suggests that they could be given in terms of pre-war values. The vital importance of a large and highly developed aluminum fabricating industry in the country.

27. NEW BOOKS

27-74. **Modern Operational Mathematics in Engineering.** Ruel Vance Churchill. 316 pp., diagrs. McGraw-Hill Book Co., 330 W. 42nd St. New York. $3.50.

An introductory treatment of Fourier series and their application.

27-75. **Chemical Engineering Thermodynamics.** Barnett F. Dodge. 698 pp., diagrs. Chemical Engineering Series, McGraw-Hill Book Co., 330 W. 42nd St., New York $6.00.

A textbook primarily for graduate students but also useful as an undergraduate text in the laws of thermodynamics and their application to chemical engineering.

27-76. **Experimental Spectroscopy.** Ralph A. Sawyer. 331 pp., illus., diagrs., Prentice-Hall, New York. $5.00; textbook edited $3.75.

A discussion of prism and grating spectrographs, and the techniques of their use in research.

27-77. **Planers.** Emanuele Stieri. 216 pp., illus., diagrs. Duell, Sloan & Pierce, New York. $1.50.

Descriptions of the general construction of the planer, its driving and feed mechanisms, all necessary adjustments and the various types of cutting tools employed for all planer operations.

27-78. **Infrared Spectroscopy, Industrial Application and Bibliography.** Robert Bowling Barnes and others. 236 pp. Reinhold Publication Corporation, New York. $2.25.

27-79. **Der Warme—und Kalteschutz in der Industrie.** Josef Sebastian Cammerer. 2nd Ed. 322 pp. illus., J. W. Edwards, Ann Arbor, Mich.

27-80. **Die Prufung der Metallischen Werkstoffe.** 760 pp., illus., (Handbuch der Werkstoffprufung, v. 2) J. W. Edwards, Ann Arbor, Mich. $24.20.

27-81. **Pruf — und Messeinrichtungen.** Erich Siebel. 672 pp. illus., (Handbuch der Werkstoffprufung, v. 1), J. W. Edwards, Ann Arbor, Mich. $23.00.

27-82. **Chemische Physik der Metalle und Legierungen.** Ulrich Dehlinger. 185 pp. illus., J. W. Edwards, Ann Arbor, Mich. $4.25.

27-83. **Stanzereitechnik; v. 1, Schneidende Wekzeuge; 2nd ed.** Heinrich Hilbert. 312 pp., illus. J. W. Edwards, Ann Arbor, Mich. $7.15.

27-84. **Prufung und Bewertung elektrotechnischer Isolierstaffe.** Rudolf Nitsche. 336 pp., illus. J. W. Edwards, Ann Arbor, Mich. $7.55.

27-85. **Grundlagen und Kennlinien der Elektronenrohren.** Horst Rothe. 406 pp., illus., (Bucherei der Hochfrequenztechnik, v. 2), J. W. Edwards, Ann Arbor, Mich. $9.50.

27-86. **Die technische Physik der elektrischen Kontakte.** Ragnar Holm. 347 pp., illus., J. W. Edwards, Ann Arbor, Mich. $9.00.

27-87. **Plastische Eigenschaften von Kristallen und Metallischen Werkstoffen.** Albert Kochendorfer. 323 pp., illus., J. W. Edwards, Ann Arbor, Mich. $9.30.

27-88. **Belastungsglieder, Formeln und Zahlentafeln fur Querkrafte, Momente und Belastungsglieder; 5th ed.** Adolf Kleinvogel. 127 pp., illus., J. W. Edwards, Ann Arbor, Mich. $4.00.

27-89. **Gitteraufbau Metallischer Systeme.** Uhlrich Dehlinger. 533 pp., illus., (Handbuch der Metallphysik, 1; pt. 1) J. W. Edwards, Ann Arbor, Mich. $13.75.

27-90. **Grundlagen und Mathematische Hilfsmittel der Hochfrequenztechnik.** Hans Georg Moller. 304 pp., illus., (Lehrbuch der Drahtlosen Nachrichtentechnik, v. 1) '44, J. W. Edwards, Ann Arbor, Mich. $8.20.

27-91. **Spanlose Formung der Metalle.** G. Sachs. 288 pp. illus., (Handbuch der Metallphysik, 3; pt. 1) J. W. Edwards, Ann Arbor, Mich. $8.45.

27-92. **Thermodynamik Metallischer Mehrstoffsysteme.** Karl W. Wagner. 360 pp., illus., (Handbuch der Metallphysik, 1; pt. 2.) J. W. Edwards, Ann Arbor, Mich. $10.55.

27-93. **Chemical Machinery.** Emil R. Riegal. 583 pp., illus., Reinhold Publishing Co., New York. $5.00.

An elementary treatise on equipment for the process industries.

27-94. **The Liquidation of War Production.** A. D. H. Kaplan. 133 pp., McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18, N. Y. $1.50.

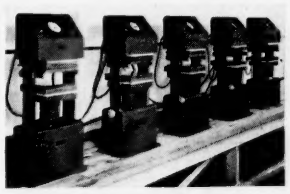
A research study by Committee for Economic Development. Surveys the problems of cancellation of war contracts and disposal of government-owned plants and surpluses, and suggests definite policies and methods of solution.

NEW PRODUCTS IN REVIEW

LABORATORY PRESS

Kingsbacher-Murphy Co., Los Angeles, Calif.

For manufacturing processes requiring pressures up to 40,000 lb., this Preco laminating and laboratory press answers many problems. Compact, it stands only 27½ in. high, weighs only 200 lb. It is designed to perform practically any small-scale pressure test or operation such as laminating and molding powdered metals, crushing, breaking and shearing tests, etc.



The press has a 750-watt heating element cast into each 8x8-in. platen. Platens are self-leveling, making adjustments unnecessary. It is equipped with dual thermostatic controls for accurate temperature adjustment and precise heat control. A specially designed and patented two-stage hydraulic pump provides rapid closure of the platens to the point of contact, then automatically shifts to low speed until desired pressure is reached.

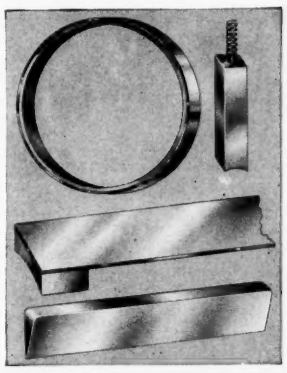
Mention R418 When Writing or Using Reader Service.

SILVER CURRENT COLLECTOR DEVICES

Gibson Electric Co.,

8362 Frankstown Ave., Pittsburgh 21, Pa.

Various current collector devices made of silver and silver alloys are now produced by this company. The many intricate mechanisms essential to the successful prosecution of the war necessitated commutator designs for which silver is, in many cases, the most economical metal. After extensive research, Gibson engineers have developed means of producing small and intricate commutator segments of various shapes for numerous applications.



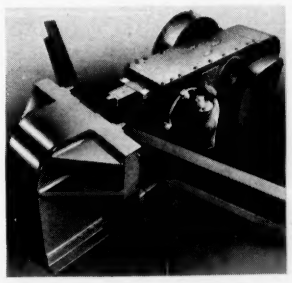
These are made within very close tolerances and at the same time the maximum hardness and wearing qualities of both silver and silver alloys are maintained. Illustrated are a few typical parts now being produced to meet the demand of electrical manufacturers for special applications. Applications also include installations in equipment such as searchlights and airplane turrets, and in various precision instruments and control equipment where maximum conductivity and minimum contact resistance are required.

Mention R419 When Writing or Using Reader Service.

BENDING AND STRAIGHTENING MACHINE

Thomas Machine Mfg. Co., Pittsburgh 23, Pa.

A new line of bending and straightening machines is now available in six sizes having capacities ranging from 50 to 400 tons for cold bending and straightening structural shapes and other metal forms. Weighing from 3800 to 55,000 lb., these machines can, for example, bend and straighten 5-in. to 24-in. beams.



Heating is not required since the work is performed cold and one man handles the operation. A continuously running ram with one bending block, striking against the shape to be bent midway between two bearing blocks, represents the operating principle of the machines. Length of stroke of the ram is quickly adjustable by a convenient hand-wheel so located that the operator has unobstructed view of his work. Bulletin No. 315 describes the machines.

Mention R420 When Writing or Using Reader Service.

ELECTRONIC RECORDERS RELEASED

Brown Instrument Co., Philadelphia, Pa.

Release of an electronic circular chart electric controller for manufacture of either war or civilian goods is announced as one of the first of several electronic instruments to be released in quantities and without rationing.

The electronic recorder of the type released is being used in, and is of special interest to, the metallurgical and chemical industries. The release stipulations specify eight weeks for delivery of two models. Each model will have several new features, including a control point index which is in red and of the same general shape as the black temperature pointer.

Mention R421 When Writing or Using Reader Service

HEAT TREATING RESISTANCE WELDS

General Electric Co., Schenectady, N. Y.

A new tempering attachment, for use with G.E. synchronous spot welding controls which incorporate the phase-shift method of heat control, has been announced by the Industrial Control Division of this company. The new auxiliary control is particularly suitable for use in spot welding of air-hardenable steels, since it permits tempering the weld while the work is still in the machine, thus reducing hardness and increasing ductility.

The attachment consists of a heat-control and a time-control adjuster for tempering, and the relays which automatically transfer the additional heat-and-time adjustment from the spot welding control.

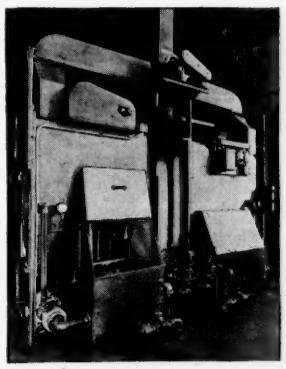
The new attachment is enclosed in a metal case designed for wall mounting. The calibrated adjustment dials are mounted on the hinged door of this case, together with an on-off switch for preventing the relays from being energized when ordinary spot or pulsation welding is being done. A 4-page booklet gives complete details.

Mention R422 When Writing or Using Reader Service.

MONORAIL-SPRAY METAL WASHER

Metal Washing Machine Div., American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Ind.

A new and improved design in metal washing equipment, the monorail-spray washer, has been developed to handle metal parts which must be rotated while they are passing through the cleaning chamber for highest cleaning efficiency. Typical work of this type includes intricate circular parts or those with many ports, crevices or openings.



A monorail conveyor is provided to carry the work through the path of well-positioned power sprays. Parts are suspended from hooks and can be rotated while passing through the cleaning stages. Accessibility of all working parts is an important feature of the new design. The high pressure pumps and controls are easily serviced. Large access doors are provided to enable the removal of the spray system when periodic cleaning is necessary.

Although the standard washer is designed primarily for washing and rinsing operations, it is so constructed that additional units like drying and rustproofing sections may easily be added to the machine to suit variations in production setups. It is described in Bulletin No. 9.

Mention R423 When Writing or Using Reader Service.

Men and Materials Perform

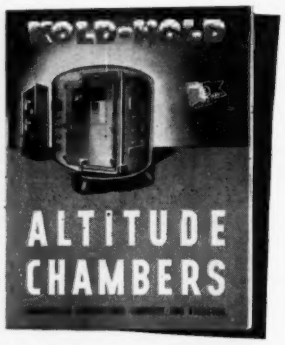
This typical post-battle scene shows U. S. Sailors inspecting 6-in. shell cases prior to replacing them in their containers for return to Ordnance bases for re-loading. These containers, manufactured by Norris Stamping and Mfg. Co., are hermetically sealed to insure perfect performance in battle by eliminating the possibility of corrosion or dirt accumulating. The application of scientific pH control, introduced by Kelite Products, Inc., in the cleaning and processing of these containers has been an important factor in the production records for which Norris has received high praise.

MANUFACTURERS' CATALOGS IN REVIEW

Flying Conditions Produced at Will

Kold-Hold Mfg. Co., 400 Grand Ave., Lansing 4, Mich.

One of the reasons why our planes are out-performing all others lies in the engineering ingenuity which has devised pre-testing equipment. This new bulletin describes a line of altitude chambers in which a manufacturer can see exactly how his products and materials will react and perform at any given altitude, temperature, and degree of humidity. Everything which goes into a plane can be tested under conditions more severe than will ever be encountered in actual flight. Complete details are presented in this new bulletin.



Mention R424 When Writing or Using Reader Service.

Regulators for Welding and Cutting

Victor Equipment Co.,
844 Folsom St., San Francisco, Calif.

This 16-page bulletin illustrates the design and construction features of certain types of single and two-stage reduction regulators employed in the welding industry. It deliberately discloses design and construction details which are too often hidden from the view of the prospect who receives simply written claims instead of supportable evidence. This bulletin will interest many engineers and welding department heads.

Mention R425 When Writing or Using Reader Service.

Resinoid Grinding Wheels

Norton Co., Worcester 6, Mass.

This is a pictorial six-page leaflet on resinoid grinding wheels and their ability to speed snagging jobs. These wheels are said to deliver fast and smooth cutting action, to hug the work, and to be free from vibration and uniformity of grinding action.

Mention R426 When Writing or Using Reader Service.

Spot Welder Catalog

Eisler Engineering Co.,
740 S. 13th St., Newark 3, N. J.

This new 58-page catalog No. CE-44W, entitled "Spot Welders," shows all types of standard and many special resistance welding machines in the capacity range from 3 kva. to heavy duty models up to 500 kva.

The new catalog with over 300 illustrations and diagrams displays pictures of individual foot, air and motor operated welders, shows application and installational views and gives specifications, operating and technical data on the particular type of the various models, generally employed in the diversified industries with heavy duty work. Included is also an instruction welding chart.

Chapter headings include: Air operated spot welders with adjustable special arms and welding tips for unusual welding operations . . . Universal spot and seam welder (200 kva.) . . . Multiple spot welders with pressure electrodes . . . Butt welders, light and heavy duty type . . . Gun welders of all kinds . . . Transformers . . . Contract job spot welding service. The catalog covers the development of 25 years of specialized experience in designing and manufacturing all types of resistance welding machines. It is available upon request.

Mention R427 When Writing or Using Reader Service.

Open-Hearth Furnace Control

Leeds & Northrup Co.,
4934 Stenton Ave., Philadelphia, Pa.

Anyone who aims at top production from open-hearth furnaces, by running them at the top safe temperature without endangering the roof, should be interested in this completely revised bulletin, "Limiting the Temperature of Open-Hearth Roofs." This shows how open-hearth men may have all the benefits of Micromax electric control, applied now to roof temperature.

This system—actuated by a Rayotube detector sighting directly on the furnace roof—automatically maintains desired temperature by continuously regulating fuel input. The Rayotube detector is applied to the front wall of tilting hearth furnaces . . . to the rear wall of stationary furnaces. Schematic diagrams show typical applications of the equipment; numerous photographs illustrate actual installations. This 16-page bulletin is available from the company upon request or through use of the Reader Service Coupon.

Mention R428 When Writing or Using Reader Service.

Centralized Lubrication Systems

Farval Corp., 3295 E. 80th St., Cleveland 4, Ohio.

How centralized lubrication systems increase the production output of machinery and at the same time make impressive savings in time, power and lubricating materials, is the theme of Bulletin No. 25. This 16-page booklet is a graphic portrayal of the theory and practice of mechanical lubrication.

Mention R429 When Writing or Using Reader Service.

Car Bottom Furnaces

Hevi Duty Electric Co., Milwaukee, Wis.

Car-bottom furnaces have a wide use in many industries for annealing, hardening, aging, stress relieving, nitriding and other heat treating operations where heavy parts or a large volume of work must be heat treated at a temperature of 2000° F. or below, this four-page leaflet points out. Construction features and design of this electric car-bottom furnace are described and illustrations depict four car-bottom furnaces used for nitriding aircraft engine cylinder barrels; for heat treating steel castings; twin car-bottom furnaces with car and turntable for heat treating steel plates; and car-bottom furnace for annealing parts requiring controlled cooling.

Mention R430 When Writing or Using Reader Service.

"Wear, A Discussion of The Mechanism of Wear Phenomena and Influencing Factors"

The Nitralloy Corp., 230 Park Ave., New York, N. Y.

This 46-page booklet by D. Landau, industrial applications engineer of this company, is believed to be the first book in the English language to be published on the subject of wear. Titles of the articles give an idea of the contents: "The Mechanism of Wear," "Wear and Physical Properties," "Molecular Adhesion," "Surface Melting," "Specific Pressures," "Lubricants and Wear," "Galling," "Scoring," "Fretting," "Gear Pitting," "Work Hardening," "Chemical Effects," "Wear In," "Wear Out," "Wear of Nitralloy vs. Other Steels," "Surface Finish and Wear."

Mr. Landau defines wear as "the unintentional removal of material from the surfaces of objects in relative motion." That soft materials may wear away the hardest ones is shown by the fact that needles used in carpet making, into the eyes of which were inserted stellite bushings, wore out when 40,000 miles of flax were passed through the eye. The author has crystallized a considerable amount of data into a small space and made its reading a profitable pleasure. The book closes with an excellent bibliography.

Mention R431 When Writing or Using Reader Service.

Aluminum Tubing, Wire, Rod and Bar

Reynolds Metals Co., 2500 S. 3rd St., Louisville, Ky.

This company has issued two new data bulletins on aluminum forms. The tubing bulletin describes the production of seamless aluminum tubing by extruding cast ingots into tube blooms of a pre-determined size, and cold drawing the blooms to tubes of closely controlled quality and dimensions. Sizes and sections, alloys and tempers, lengths, finishes and ordering data are presented in this eight-page leaflet.

Wire, bars and rods are defined and manufacturing methods described in the 12-page leaflet on these products. Here again the alloys and tempers, sizes and sections and ordering data are presented.

Mention R432 When Writing or Using Reader Service.

Cemented Carbide Tools, Blanks, and Specialties

Kennametal Inc., Latrobe, Pa.

This new and enlarged 48-page catalog on cemented carbide tools, blanks and specialties has several new features. A graphic index on the inside front cover provides a quick means of locating any tool or product. The manufacture and uses of Kennametal are described on pages 2 and 3. Tools, illustrations of their primary applications, and specifications and prices are shown in the sections from pages 6 to 18. Centers appear on page 19, the new lathe files on page 20, and the blank listings are in the next four-page section. Sections are devoted to "How to Specify and Order Kennametal Special Tools," "Chip Breakers for Kennametal Tools," etc.

New features include the "Materials Machined" charts, and sections on "Use of Tools," and "Tool Wear Analysis."

Mention R433 When Writing or Using Reader Service.

Carbide Tool Catalog

Willey's Carbide Tool Co.,
1340 W. Vernor Highway, Detroit, Mich.

This 36-page catalog illustrates and prices standard tungsten carbide items and shows typical applications of special design. Well-indexed, the book describes blades, blanks, centers, cutters, dies, drills, gages, etc. It gives brazing instructions for preparing tools, and contains many other helpful tool tips.

Mention R434 When Writing or Using Reader Service.

Position Welding

Ransome Machinery Co., Dunellen, N. J.

Information on position welding and a description of the complete Ransome line of welding positioning equipment is featured in this 40-page bulletin, No. 2130. It treats with the many advantages of proper positioning for welding and fully explains the use of positioning equipment with pictures and text. The complete range of positioners from a small hand-operated unit to the 40,000-lb. heavy-duty machine is illustrated. Dimensions, load capacities and complete specifications on each model are included. A good selection of installation photographs showing various models in diversified use are scattered throughout the book.

Mention R435 When Writing or Using Reader Service.

Rotary Shears

Kling Bros. Engineering Works,
1308 N. Kostner Ave., Chicago 51, Ill.

This 8-page illustrated bulletin No. 245 describes rotary shears which are available in six sizes. These machines will cut or form straight lines, openings, circles, rings, reverse curves, odd shapes, strips, bevels, flanges, joggles and offsets. The largest machine will shear sheets or plates up to 1 in. in thickness, and each shear will cut any thickness of sheet or plate up to its rated capacity.

Mention R436 When Writing or Using Reader Service.

Dust and Fumes From Magnesium Alloy Processing

Peters-Dalton, Inc., 628 E. Forest Ave., Detroit 1, Mich.

"The Collection and Control of Dust and Fumes From Magnesium Alloy Processing" is the title of this new 20-page booklet. Written by O. E. Fenn, in ten chapters, it covers such subjects as requirements of dust collecting systems, safety precautions, use of proper precipitating fluids, cleaning with metallic abrasives, suggested air volumes and other valuable information of interest to fabricators of magnesium alloys.

Mention R437 When Writing or Using Reader Service.

Steel Technical Bulletin

Monarch Steel Co., Indianapolis and Hammond, Ind.

Two steels that increase profits by reducing costs while increasing production, minimizing rejections and improving ultimate quality are described in detail in a new, profusely illustrated 24-page bulletin, "Speed Case and Speed Treat Cold Finished Bars." This booklet amounts to a technical treatise on a medium, high carbon open-hearth steel and a low carbon open-hearth carburizing steel.

Mention R438 When Writing or Using Reader Service.

Oxy-Acetylene Methods for Steel Foundries

Air Reduction Co., 60 E. 42nd St., New York 17, N. Y.

Producer of welding equipment and supplies, this company is now distributing a new 32-page booklet "New and Improved Oxy-Acetylene Methods for Steel Foundries". Profusely illustrated, the booklet, as its name implies, describes numerous new and improved methods of performing common steel foundry operations by the use of the oxy-acetylene flame.

Principal stress among the methods described is laid on the removal of risers by machine flame cutting. A number of examples of this practice are illustrated and comparisons are drawn with the hand torch method of riser removal.

Other processes treated in the booklet include flame scarfing to remove pads left after riser removal; flame gouging for the removal of webs, fins and defects; flame descaling for cleaning normalized or annealed castings; flame lancing and its various uses in the steel foundry, and flame hardening for the localized hardening of steel castings. In a number of instances, actual comparisons with former methods of performing the work show important economies effected by the processes described. Also included in the booklet is a section describing and illustrating equipment recommended for the various processes. Copies may be obtained from Air Reduction or by use of the Reader Service Coupon.

Mention R439 When Writing or Using Reader Service.

Submerged Combustion

Submerged Combustion Co., Hammond, Ind.

This 12-page booklet describes submerged combustion as one of the leading tools of industry. Plants which have installed this improved method of simultaneously heating and agitating pickling solutions have realized the advantages of increased production, reduced pickling time, reduced solution heating costs, and substantially reduced acid consumption. This booklet portrays the engineering features of the method together with a summary of experience among users.

Mention R440 When Writing or Using Reader Service.

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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